RM/R146

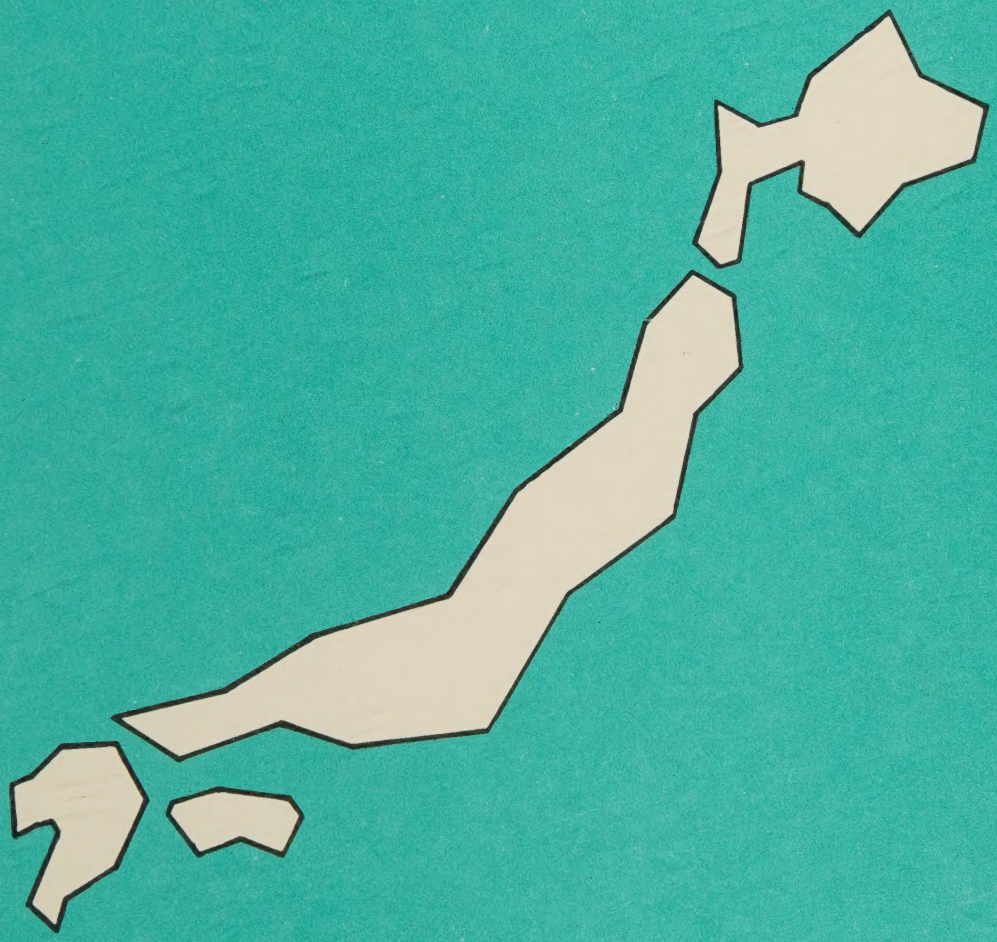
FAO Fisheries Reports No. 146 FIIM/R146 (En)

# report of the
# TECHNICAL CONFERENCE ON FISHERY PRODUCTS

水　　産　　物

LIBRARY
FEB 5 1975
FISH & WILDLIFE SERVICE

TOKYO, Japan, 4-11 December 1973



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Digitized by the Internet Archive
in 2025

https://archive.org/details/fao-fisheries-and-aquaculture-report_1973-12_146

# REPORT

of the

# TECHNICAL CONFERENCE ON FISHERY PRODUCTS

Tokyo, Japan, 4-11 December 1973

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, May 1974

## PREPARATION OF THIS REPORT

This is the official report of the Technical Conference on Fishery Products which was held in Tokyo, Japan, from 4-11 December 1973. The technical papers of the Conference and the discussions will be published in book form by Fishing News (Books) Limited, London, England.

**Distribution:**

FAO Member Nations
Participants and contributors
International and national organizations
FAO Department of Fisheries
Fishery Officers in Regional Offices

**Bibliographic entry:**

FAO (1974)
FAO Fish.Rep., (146):59 p.
Report of the Technical Conference on Fishery Products, Tokyo, Japan, 4-11 December 1973

FAO fisheries reports. Technical conference - fishery industrial products. Present products and trends. Handling, preservation, processing. Tropical aquaculture - fish products. Product development - fish protein, fish meal, fish oil. Markets - export, quality standards. Training and education. International cooperation - fish industry development, institutions. Addresses to meeting. List of participants. List of papers presented.

CONTENTS


| | | Page |
|---|---|---|
| INTRODUCTION | | 1 |
| REPORT OF THE TECHNICAL SESSIONS | | 3 |
| I | Fishery Products | 3 |
| II | Present Products and Trends | 5 |
| | Section 1 - Handling and Preservation | 7 |
| | Section 2 - Processing | 7 |
| | Section 3 - Tropical Fish and Aquaculture | 8 |
| III | Product Development and Future Challenges | 10 |
| | Section 1 - Fish Supply and Utilization | 12 |
| | Section 2 - Fish Protein, Fish Meal and Fish Oil | 13 |
| IV | Markets | 15 |
| V | Training | 17 |
| VI | International Cooperation | 19 |
| SUGGESTIONS OF THE CONFERENCE | | 21 |
| REPORT OF THE AD HOC WORKING GROUP ON COMMINUTED (MINCED) FISH | | 24 |
| Appendix 1 - Address by Mr. T. Kamenaga, Vice-Minister of Agriculture of Japan | | 26 |
| Appendix 2 - Address by The Chairman, Mr. I. Arakatsu, Director-General, Fishery Agency of Japan | | 28 |
| Appendix 3 - Keynote Address by Mr. Roy I. Jackson, Deputy Director-General, Food and Agriculture Organization of the United Nations, at the Opening Session | | 30 |
| Appendix 4 - Address by Mr. Herman Watzinger, Director of the Fishery Industries Division, Food and Agriculture Organization of the United Nations, at the Closing Session | | 34 |
| Appendix 5 - List of Participants | | 35 |
| Appendix 6 - List of Papers | | 53 |
| Appendix 7 - Steering Committee | | 59 |

## INTRODUCTION

A number of important considerations relative to the world fisheries situation led the Director-General of FAO, authorized by the Council of the Organization, to convene a Technical Conference on Fishery Products in December 1973.

Two major factors of that situation were the increasing demand for fish by the growing world population and the critical state of some of the main traditional stocks of fish. Both these factors demand better management and more rational exploitation of resources and, in particular, effective utilization of those aquatic resources at present ignored or under-exploited or otherwise wasted, as well as the development of new fisheries. An example of the potential in these fields has been disclosed in recent years by increased knowledge of the resources of the Indian Ocean. Abundant stocks of mackerel and oil sardines have been found there and a wide distribution of anchovy. There is also a significant abundance of such stocks as horse mackerel, herring, saury, capelin, sand eels, and squids, all of which could be harvested to a much greater extent than they are at present. Similar possibilities for more effective exploitation of resources and opening up new fisheries exist in many other parts of the world.

However, before this can be profitably undertaken, the problem of limited market outlets must be solved. This is already a serious constraint and the need to consider it was another factor in favour of holding a Technical Conference on Fishery Products because the problem is largely concerned with product development.

Another major factor in the fisheries situation is that a majority of the resources which should be more effectively exploited are to be found in the developing countries. Understandably, these countries are determined to play a greater part in such exploitation which inevitably means that their problems of handling, preserving, processing, marketing and distribution of fish and fishery products will become more pressing. They will be in need of increased international aid, including assistance from the fishery industries of the technically advanced countries, to speed up and effectively organize the industrial development involved.

One other important consideration for holding the Conference was that it was needed to complete FAO's work in the fishery products field during the previous decade or so. The landmarks of this work are four product conferences:

(1) Fish in Nutrition (Washington, D.C., U.S.A., 1961)
(2) Fish Utilization (Husum, Federal Republic of Germany, 1964)
(3) Freezing and Irradiation of Fish (Madrid, Spain, 1967)
(4) Fish Inspection and Quality Control (Halifax, Canada, 1969)

Thus, in all respects, the time had come to hold a Fishery Products Conference. Once this was decided, it was fortunate that, at the kind invitation of the Government of Japan, it was possible to hold it in Tokyo. This was an ideal venue from all points of view because Japan is a world leader among fishing nations and is highly advanced in fish handling and processing, being especially strong in product development. This meant that the participants at the Conference not only benefitted through the technical papers and discussions but also, from a practical point of view, through visits to many Japanese fish processing firms.

In view of the importance of the Conference to both developed and developing countries, and to both industry and governmental authorities concerned with fisheries, it was gratifying to note that the attendance was well balanced between these interests. Of the 252 participants (from 55 FAO member countries and the U.S.S.R., with observers from five international organizations having status with FAO) some 40 percent were from developing countries and about 30 percent from industry. Such a gathering, therefore, provided an exceptional opportunity for the exchange of knowledge and experience gained in all parts of the world by both industry and governmental organizations. The general high level of interest evidenced by the participants was maintained throughout the six Sessions of the Conference and led to stimulating and valuable discussion periods.

A special note of appreciation is due in this Introduction to the Government of Japan as the host of the Conference. The meeting was held from 4 to 11 December in the Keidanren Kaikan Building, Tokyo, which was specially designed for large-scale conferences. The facilities and arrangements were excellent and the Japanese staff, assigned by the authorities to the Conference, were always courteous and willing workers throughout the longest day. All these arrangements did much to ensure the efficient and effective operation of the Conference. Similarly, the official tours organized by the Government in collaboration with the Japanese fishery industry, and the extensive exhibition staged by the industry, provided a most valuable adjunct to the Conference. In particular, these extra activities were of special value to the 20 fellowship holders from developing countries whose attendance was financed by a number of international aid agencies in FAO member countries.

# REPORT OF THE TECHNICAL SESSIONS

## SESSION I

## FISHERY PRODUCTS

Chairman: D. Layachi, Morocco
Moderator: P.M. Hjul, U.K.

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 15 | The contribution of fish technology to the utilization of fish resources | G.H.O. Burgess, U.K. |
| R 16 | Some dynamics of fisheries | R. Finch, U.S.A. |
| R 22 | Fish and its place in culture | R. Kreuzer, FAO |
| R 26 | The fishery products industries in the developing world | A. da Costa, FAO |

Following the official opening of the Conference on the morning of Tuesday, 4 December 1973, the first Technical Session commenced at 14.00 hours. The subject, "Fishery Products", served to concentrate attention on the main objective of the Conference with the four review papers providing an extensive and searching account of the circumstances and factors which have influenced, and are influencing, the development of fisheries, with special emphasis on product development.

After the authors present had spoken on their papers, the main discussion centred on the role of governmental research institutes in relation to industry, particularly in promoting the development of new or improved processes and products, with special reference to the utilization of unfamiliar species.

Several participants described the organization and function of their research laboratories, institutes, and services relative to industry. In the technically advanced countries it seems that very effective liaison and practical working arrangements have been established between the scientific and technical research bodies and industry. This, in practice, means that the research programmes are attuned to the known and anticipated needs of industry. For example, since the problems of utilization of unfamiliar species and the development of new products have become matters of high priority for industry, the research organizations have concentrated on them to the extent required in relation to their many other activities.

The situation in developing countries, however, is very different and a number of speakers referred to the difficulties faced both by industry and by the research bodies. In the former case there is the problem of being unable to provide the researchers with adequate and accurate information and statistical data required for planning research programmes. In the latter case, the problem is largely one of insufficient funds and lack of trained staff. There is also the fact that in most, if not all, developing countries, research and development of a fishery depends largely on the leadership of the governments concerned.

With reference to the need to utilize many species not commonly used in large quantities, it was stressed that this development will be of special value in the coastal fisheries of many countries. The suggestion was made, therefore, that FAO should establish a Working Group to identify resource potential for development and to identify the problems which will need to be resolved by the application of technology or by market introduction.

## SESSION II

## PRESENT PRODUCTS AND TRENDS

Chairman: J.W. Slavin, U.S.A.
Moderator: E. Heen, Norway

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 10 | A quick-salting process for fish | F.R. Del Valle, Mexico |
| R 12 | Rapid salting of fish | J.M. Mendelsohn, U.S.A. |

Experience Papers

| | | |
|---|---|---|
| E 2 | The commercial exploitation of South African hake | K.A. Oettle, IAFMM |
| E 4 | Problems in the utilization of freshwater fish | D.G. Iredale, Canada |
| E 5 | The commercial utilization of Cape hake | J.A. Burt, U.K. |
| E 6 | Traditional stuffed carp ("Gefilte Fish") | A. Herzberg, Israel |
| E 11 | Considerations in the use of tropical fish species | J.G. Disney, R.C. Cole, N.R. Jones, U.K. |
| E 15 | Production of liquid fish silage for animal feed | M.L. Windsor, U.K. |
| E 16 | Containerized stowage on fishing vessels using chilled sea-water cooling | G.C. Eddie, A.G. Hopper, U.K. |
| E 17 | Studies on the acceptability of farmed fish | A. Hume, J.R. Burt, C.S. Wardle, C.A. Bustard, D.E.P. Watson, U.K. |
| E 18 | Handling and processing the deep-sea shrimp, Pandalus borealis, for the freezing industry | J. Aagaard, Denmark |
| E 20 and Add.1 | Trends in the utilization of Alaska pollack in Japan | M. Okada, E. Noguchi, Japan |
| E 22 | The abalone industry in Australia | D.G. James, J. Olley, Australia |
| E 23 | Development in bulk preservation at sea of small whole fish | P. Hansen, FAO K.B. Olsen, T. Ettrup-Petersen, Denmark |
| E 24 | Bacteriological aspects of tropical shrimp | D.C. Cann, U.K. |

| | | |
|---|---|---|
| E 29 | The United States experience with Pacific hake (*Merluccius productus*) | J.A. Dassow, A.J. Beardsley, U.S.A. |
| E 30 | New methods of shellfish processing in the United States | R.J. Learson, U.S.A. |
| E 31 | Latest results in technology of preserving and handling small pelagic fish for food and feed | A. Mjelde, N. Urdahl, Norway |
| E 32 | Technology of processing Atlantic sardine | M. Bidenko, V. Shenderyuk, L. Agzhitova, U.S.S.R. |
| E 37 | The potential use of squid as a protein source | C.M. Lee, Tung-Ching Lee, C.O. Chichester, U.S.A. |
| E 40 | The catches and utilization of shellfish in Japan | T. Motohiro, Japan |
| E 41 | Processing and utilization of mackerel | Y. Seno, Japan |
| E 44 | The utilization of small pelagic species | E. Heen, Norway |
| E 45 | Initial treatment of some fish species caught in the Indian Ocean | V.P. Bykov, U.S.S.R. |
| E 46 | Environment-related off-flavours in intensively cultured fish | T. Lovell, U.S.A. |
| E 49 | Utilization of mechanically separated fish flesh - Canadian experience | C.M. Blackwood, Canada |
| E 50 | Processing of Lake Tanganyika sardines in Burundi | H.J. Horn, FAO |
| E 51 | Salting, drying and smoking *Tilapia galilaeus* from Volta Lake | K. Watanabe, E.M. Mensah, FAO |
| E 54 | Problems in the utilization of freshwater fish in some tropical countries of Asia and the Far East | D.D. Tapiador, FAO |
| Technical Note 3 | Analytical indications of a more rational approach to accelerated fish sauce production | G.E. Howard, J. Dougan, U.K. |

In view of the extensive range of subjects to be found under the general heading of "Present Products and Trends", it was decided to organize Session II into three sections. The following arrangements, therefore, were made: Section 1 - "Handling and Preservation" - was conducted by the Chairman and Moderator for the complete Session; Section 2 - "Processing" - was chaired by V.P. Bykov (U.S.S.R.), with J.R. Burt (U.K.) as the Moderator; and Section 3 - "Tropical Fish and Aquaculture" - was chaired by M. Balasingam (Malaysia), with N.R. Jones (U.K.) as the Moderator. The report of Session II, therefore, follows this arrangement and is in three sections.

SECTION 1

As the papers relative to this Section were of a strictly practical nature, largely concerned with experience in handling and processing fish in bulk, attention was concentrated on handling and preservation problems, including the use of containers and such special processing techniques as new quick-salting methods and colour problems encountered in processing shrimp.

There was general agreement that present-day handling and preservation were wasteful. It was pointed out, for example, that in trawling discards at sea are substantial and sometimes amount to 50 percent. The need, therefore, is to improve the use of and economic return from all available resources, both traditional and new, by the development and adoption of improved or new techniques in these fields.

A number of the participants described recent progress in bulk preservation of small whole fish at sea. Workers have been killed, and are still being killed, by hydrogen sulphide or carbon dioxide emitted from bulk stored fish in vessels. However, it has now been found that simple ice packing provides a means to avoid such conditions. It maintains the quality of large catches and avoids waste and health hazards. However, there is still a long way to go before proper chilling and handling become the daily practice in the world's fisheries. Government authorities, research workers, fishing boat designers and builders, fishermen and the fish processing industries need to work together to achieve a solution to these problems.

It was agreed that chemical preservatives could be used because of their general bacteriocidal activity and selective effect on microflora, but only if their limitations and hazards are known and controlled. The use of chemicals should be "tailor-made" to meet the specific requirements of the fishery and conditions concerned.

Much interest was evinced in the development of containerization for use in fisheries. While the work done in this field indicates reduction of wastage of fish by spoilage, it was recognized that the new system would make heavy and extensive demands on industry, such as special designs for vessels and the redesigning of ports and markets, and so on. As there appears to be a promising future for containerization in fisheries, the participants felt that FAO should consider ways of helping port and fish market authorities plan to accommodate the new system.

The discussions on improved quick-salting of fish processes indicated their usefulness to developing countries and for utilizing unfamiliar species and by-catch fish. A number of products are now being made from salted minced flesh. These have good keeping qualities, are highly nutritious, and are cheap and easy to distribute in areas outside the main marketing system.

The diversity of taste was illustrated in the discussion about the colour of shrimp products. In some markets, for instance, processed shrimps have to be bright red while, in others, they have to be dull red. Further discussion about shrimp processing was concerned with yields obtained by various methods of storage and how to keep the catch in prime condition.

SECTION 2

As was to be expected, the subject of "Processing" covered a variety of products, including those made from shellfish and squid. In particular, a great deal of attention was paid to experience with, and the potential of, minced or comminuted products. The production of these on a large scale has now been made possible by the development of sophisticated deboning and flesh-stripping machines.

One of the most interesting potentials of the machines is in processing unfamiliar species. The recovery of the fish flesh by the machines substantially exceeds the yield from conventional filleting. Further, mixed species of fish of similar flesh colour, texture, odour and

flavour can be processed by this means in a wide range of new, high quality products. This is already being done in some of the technically advanced countries where popular demand for the products, such as fish cakes and fingers, party starters with shrimp and crab added, fish and chips, and salmon croquettes, already exceeds supply. The flexibility in the use of such minced raw material, which can be stabilized and modified to make a wide variety of products, offers the fishery products industry a remarkable freedom in product development.

However, the participants recognized that there was urgent need for research in this field and questions to be resolved regarding quality standards, nomenclature and labelling. But it was stressed that no artificial barriers should be placed in the way of utilizing new and unfamiliar species of fish for minced products. In view of the widespread interest in the whole of this subject, the Conference decided to set up an Ad Hoc Working Group on Comminuted (Minced) Fish. The report of the Group, which is published on page 24, proposes action to be taken by FAO to promote the orderly marketing of minced products.

In further discussion, the problems associated with protein denaturation and discoloration were examined. The process of mincing, it was pointed out, disrupts the cellular structure of the muscle so that blood, air, micro-organisms and contaminants can readily be incorporated with the raw material. These may seriously change the characteristics of spoilage and storage. The process also lends itself to the incorporation of additives. It was generally agreed that these factors point to the need for much more research on comminuted products.

Other references regarding new equipment, techniques and products included the use of continuous centrifugation and microwave energy, mostly for defrosting material and for the recovery of crab meat in North America. Experiments indicate a potential for defrosting salmon and tuna loins and tempering fish blocks and bulk frozen raw material. Of the under-utilized resources, it was pointed out that a squid portein isolate had been obtained. It has functional properties which suggest that there are now new opportunities for utilizing this very large resource.

Relative to the development of new products and their adoption in their country of origin and elsewhere, it was stressed that the most successful of such products retained a link with traditional food preferences. This was one reason why products cannot easily be transferred from country to country but need to be adapted in the process to meet the preferences of the population concerned.

SECTION 3

The third Section, which was on "Tropical Fish and Aquaculture", considered such matters as chilling, freezing and cold storage, minced and dried products, live marketing, fish sauces and the main problems faced in aquaculture.

Many of the speakers, in referring to the subject matter of the various papers presented in this Section, dwelt on the problems of conserving the quality of the catch. It was generally agreed that quick-chilling or freezing were highly desirable for maintaining quality in the fish itself or in the end product. In view of the widespread difficulties in handling and processing, because of the great variety of species in tropical resources, the lack of knowledge by the fishermen about modern handling and processing techniques, the lack of experience of research and extension staff, and the lack of infrastructure and facilities, such as ice, clean water, transport and distribution, participants suggested that FAO could assist developing countries to grapple with these problems by surveying their research and development programmes and providing guidance on future planning in these fields. A number of speakers stressed that most handling and processing techniques are based on experience with temperate resources and that there is a great need to deal with tropical resources on their own merit. In this connexion, it was urged that FAO should compile the available information and publish a manual on handling and processing technology for tropical fisheries.

One of the critical needs of developing countries is to expand their export trade in order to earn much needed foreign exchange. As a number of participants stated, the export of fishery products, especially such profitable items as shrimp products, provide a means of earning substantial foreign currency. Despite pressing domestic needs for more protein-rich food, it was recognized that the overall benefit to a country may be best served by the promotion of such exports. In this respect, such countries face processing and marketing problems to determine the most acceptable forms of products and how best to put them on the available markets.

There was general agreement that aquaculture has a great potential for helping to meet the constantly increasing demand for fish and fishery products. What mostly concerned the participants were the muddy and other off-flavours in farmed fish, and problems of processing and marketing.

The experiences of various countries in combatting off-flavours were recounted. The problem, in a number of forms, appears to be prevalent throughout the world. Apart from attempts to remove the cause of off-flavours in the fish, the most common and effective remedy seems to be to keep the fish in clean flowing water for a number of days or by starving them or by a combination of both methods. Another way of dealing with the off-flavour problem is to remove the offending odour or taste in cooking the flesh in special ways. For example, a paste-like seasoning made from soya bean is used in Japan to absorb the off-flavour of carp. Much experimental work with a wide range of cultivate fish is going on through the world, including experiments in storage, processing and distribution. As was pointed out, in addition to the species which have long been farmed, it now seems practical to raise fish, such as tilapia, in large single species or polyculture operations for use as raw material for minced flesh products. While many drawbacks to the use of certain kinds of fish can now be overcome mechanically, such as deboning, some of the undesirable characteristics could be eventually eliminated through genetics. A case in point is the black belly lining in some fish.

The introduction of flesh-separating machines has opened up new possibilities for product development with farmed freshwater fish. Species are now being utilized - both farmed and wild - which hitherto have been underutilized or not utilized at all. This, it was agreed, should greatly enlarge the scope for the marketing of farmed freshwater fish products as well as those evolved from cultivated marine species. However, the Conference recognized that, in tropical countries in particular, the main method of distribution of farmed fish will remain in the live or fresh form and suggested that efforts should continue to be made to improve such distribution and marketing systems.

## SESSION III

## PRODUCT DEVELOPMENT AND FUTURE CHALLENGES

Chairman: G.H.O. Burgess, U.K.
Moderator: R. Finch, U.S.A.

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 8 | Opportunities for upgrading fish with lower market value | V.P. Bykov, U.S.S.R. |
| R 17 | Upgrading and adapting fishery products of lower market value | H. Lisac, FAO |
| R 18 | Opportunities for improving fishery products | K. Amano, Japan |

Experience Papers

| | | |
|---|---|---|
| E 1 | The future of powdered fish products | G.M. Dreosti, IAFMM |
| E 7 | The requirements for the establishment of a food fish industry | W.P. Appleyard, FAO |
| E 8 | Marketing aspects of powdered products in the future | P. Jaubert, France |
| E 9 | Utilization of sardinella resources in India | V.K. Pillai, India |
| E 10 | The manager's approach to evaluating the feasibility of food protein ventures | J.R. Champagne, U.S.A. |
| E 12 | Prospects for utilizing capelin (*Mallotus villosus*) for human consumption | P.M. Jangaard, Canada |
| E 13 | Potential production of powdered and liquid fish products for human consumption and animal feed | I.M. Mackie, U.K. |
| E 14 | Utilization of squid as food | T. Takahashi, Japan |
| E 19 | Application of fish oils in the food industry | E.J. Gauglitz, Jr., V.F. Stout, J.C. Wekell, U.S.A. |
| E 21 | Utilization of barracudina as a source of wax esters and proteins | R.G. Ackman, C.A. Eaton, P.J. Ke, Canada |
| E 25 | Functional and nutritive food proteins from fish | E.G. Bligh, W.J. Dyer, L.W. Regier, J.R. Dingle, R. Legendre, Canada |

| | | |
|---|---|---|
| E 26 | Roller-dried fish protein | L. Herborg, F. Vilien, A. Bruun, B. Eggum, Denmark |
| E 27 | Utilizing by-catch fish from Atlantic shrimp trawlers | R.J. Eyssalet, France |
| E 28 | Preparation and properties of chemically and enzymically modified protein isolates for use as food ingredients | J. Spinelli, H.S. Groninger, Jr., B. Koury, U.S.A. |
| E 33 | Pond-grown catfish in the United States: present situation and future opportunities | T.J. Billy, U.S.A. |
| E 34 | Utilization of krill for human consumption | L.L. Lagunov, M.I. Kryuchkova, N.I. Ordukhanyan, L.V. Sysoeva, U.S.S.R. |
| E 35 | Marine lipids and fatty acids in human nutrition | R.G. Ackman, Canada |
| E 36 | The practice of product development | R. Kreuzer, C. Day, FAO |
| E 38 | Aquaculture and fishery products development | T.V.R. Pillay, FAO |
| E 39 | The potential of the by-catch from shrimp trawlers | W.W. Meinke, U.S.A. |
| E 42 | Reprocessing fish into composite products | S. Ishii, K. Amano, Japan |
| E 43 | Anchoveta utilization for human consumption | E. Loayza S., FAO |
| E 47 | Product development experiments in Peru | H. Beumer, FAO |
| E 48 | The role of fish meal in alleviation of protein shortages in human nutrition | S.M. Barlow, F.W. Burton, IAFMM |
| E 53 | Alternative uses of bonito in Peru | D. de Haan, FAO |
| E 55 | The use of fish of lower market value for human consumption | N.I. Rekhina, U.S.S.R. |
| E 57 | The development of the Peruvian merluza industry | P. Andersen, W.P. Appleyard, G.H. Hordijk, E.C. Van Noort, FAO J.A. Souness, U.K. |
| E 58 | Fish protein processing: thermal liability and thermal economy | O. Myklestad, Norway |
| E 59 | Utilization of fish meal protein in modern integrated system for domestic animal feeding | T. Ettrup-Petersen, B. Holm-Christensen, E. Ettrup-Petersen, Denmark |

The same need as in Session II, to divide up the papers for consideration in sections, occurred in Session III. In this case it was found convenient to deal with them in two groups: Section 1 - "Fish Supply and Utilization"; and Section 2 - "Fish Protein, Fish Meal and Fish Oil". The Session Chairman and Moderator took charge of Section 1, while F.W. Burton (IAFMM) became Chairman of Section 2, with G.M. Dreosti (IAFMM) as Moderator.

SECTION 1

Both the papers considered in this Section, and the subsequent discussions, served to bring into sharp focus the differences in the approach to product development in developing and technically advanced countries. Thus, the main considerations prompting product development in the latter do not generally apply with such force in the former, where the chief motivation is often based on socio-economic considerations because of the political and economic patterns of those countries. For example, speakers from technically advanced countries all emphasized that the prime responsibility for the introduction of new fishery products in the effort to increase fish utilization was that of the processing industries because they have the required marketing experience and the need to expand their trade. The larger commercial concerns usually have their own well equipped laboratories for product development staffed by highly skilled personnel who work in close cooperation with their colleagues on the industrial and marketing sides. The role of the governmental research laboratories in such countries is to work on the deeper scientific and technical problems of concern to industry to provide information and guidance on such matters. It was also agreed that the smaller processing concerns in such countries do make use of the governmental organizations to assist in product development and that the research worker had an important role to play in helping to solve problems to enable industry to make progress.

In contrast to this situation, it was pointed out that in developing countries industry is usually not so well equipped to deal with product development, nor are the government laboratories and research establishments. In particular, the latter generally suffer from lack of funds and lack of highly trained staff. To these handicaps is added the impoverished state of the mass of the population and the understandable preoccupation of the governments with policies and programmes to improve the living standards of the people. In such circumstances, socio-economic considerations dominate, while considerations of marketing and profitability have little influence on decisions. As a number of participants from developing countries stressed, all product development efforts are required to conform with the socio-economic approach of the governments concerned and the resultant improved or new products must contribute to the improvement in the diet of the mass of the population.

There is, however, an important exception to this situation; that is, in the case of product development for the export market. As such products have to be of a certain standard of quality and appeal to enter international trade, due consideration has to be given to such factors as quality control and marketing. In this connexion, it was pointed out that international assistance in developing fishery industries could be of great value. In such situations FAO could play a part by helping to identify investment opportunities, setting up joint ventures, attracting foreign funds, providing technical experience and training at various levels, and so on. Relative to all this, it was agreed that international industry should become more politically conscious of the conditions in developing countries and recognize the dominance of socio-economic considerations.

Another subject which attracted the attention of the meeting was that of consumer acceptance of products. It was stressed that many difficulties were faced in establishing new products and considerable time often elapses before they are accepted by the consumer. The varied experiences which such products as fish ham and fish sausage, and those made from minced flesh, krill and squid, etc., served to illustrate this aspect. There was general agreement that the best approach in most cases was to retain, if possible, some similarity to traditional foods. This could be in the form of shape or colour or texture or odour or flavour or a combination of any of these.

One conclusion reached by the participants was that there is a need to disseminate information on the development of new products through a central agency. They thought that this was a task which FAO could undertake and expressed the hope that it would do so.

SECTION 2

Much of the discussion on fish protein, meal and oil was centred on questions relating to fish protein concentrate (FPC) and the functional fish protein (FFP). The general view seemed to be that the developing countries are likely to be able to make the best use of FPC, if suitably adapted to their requirements, while the functional product opened up the possibility of many new uses, such as the development of fish structuring materials.

Experience with FPC appears to vary. The Canadian conclusion, for example, is that the cost and limited availability of raw materials, the lack of markets and the competition from other sources of protein, leaves a poor marketing outlook for FPC type A, particularly in technically advanced countries. On the other hand, the Norwegian view is that the fish powder - FPC type B - they are now producing fits into the dietary picture of consumers in countries where dried fishery products are popular. Tests in 13 countries - some conducted in cooperation with FAO and the World Food Programme (WFP) - have shown the product to be acceptable whether or not the people are short of protein.

There was much reference to upgraded quality standards relative to the production of FPC and similar products. The standards adopted by the Norwegians are those required in the production of instant soups. As a consequence, continuous production of the product will require plants to be specially designed and constructed for this purpose. Other speakers referred to the need to develop new and economic processes and for more realistic costing of powdered products. In this connexion, there is a need to take into consideration socio-economic factors in determining the potential uses of FPC in developing countries. It was stressed that types of FPC products other than those evolved for technically advanced countries should be made for developing countries. For example, every effort has been made so far to produce a colourless, flavourless fish powder. This has resulted in the removal of rancid and fishy tastes, yet these are characteristics esteemed by consumers in many countries, such as those where stock fish dishes are popular.

Regarding the emergence of FFP, it was observed that, with its binding properties, there is the possibility of producing sophisticated fish analogues comparable with the meat analogues made from vegetable protein where the structuring materials are spun fibres. Existing fish products can be extended through the use of functional fish protein, just as meat products are extended with vegetable protein. In view of these possibilities there is a need to consider the legal implications of the new technology, especially the labelling of the products.

Consideration of fish meal led to a wide ranging discussion, the crux of which was to strike a balance between the objective of using as much as possible of the world's total aquatic resources for direct human consumption and that of making the most effective and efficient use of the resources. Many views were expressed on this issue. Eventually, the Conference as a whole agreed that where fish and other marine resources cannot, for practical reasons, be used for direct human consumption, they should be harvested and converted into meal and oil. By this means, resources which would otherwise be neglected or underexploited or not used at all would be put to constructive use for the benefit of all concerned.

It was clear from what many of the participants said that good use is now being made by a number of countries of offal and by-catch material through reduction. Such use applies, in particular, to the very large resources of small pelagic species which, at the present time, cannot be economically used for direct human consumption. Of the 30 percent of the total world catch now converted to meal and oil, some 90 percent is composed of such small species. This situation is likely to remain true in the foreseeable future when it is expected that about 80 percent of the increase in the total catch will be converted to meal and oil.

The discussion of this subject revealed that for some of the developing countries the establishment of a fish meal and oil industry is a first step toward modernization and industrialization of their fisheries. In addition to earning much needed foreign exchange through exports of meal and oil and acquiring capital for development, the countries benefit

from the industrial training of personnel through the industry. They also benefit from the availability of meal for animal feed in livestock farming and aquaculture. This benefit also, indirectly makes a valuable contribution to human nutrition while the oil made available finds uses in medicine and industry.

References to progress in the production of liquid fish protein and liquid fish silage showed that other processes could provide animal feed and other useful products. There was also considerable discussion on the problems related to fish oils and on their wider use for edible and other purposes. Examples of progress made in these fields, such as the edible use of fish oil mixed with cotton seed and soya oils, were cited. It was pointed out that, at present, the keeping quality and successful use of oil made from a mixture of vegetable and partly hydrogenated marine oils depends primarily on rapid distribution and climate, the shelflife of the product being considerably longer in colder ambient temperatures.

## SESSION IV

## MARKETS

Chairman: J.J. Diestel, Federal Republic of Germany
Moderator: W.P. Appleyard, FAO

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 1 | Quality requirements for fishery products | F. Soudan, France |
| R 3 | Development of institutional catering and other outlets for fish in the United Kingdom | J.J. Soulsby, U.K. |
| R 5 | Planning to expand markets in developed countries | A.H. Coburn, U.K. |
| R 6 | Developing the Guyana shrimp industry | F.A. Peterkin, Guyana |
| R 7 | Expansion of domestic markets in developing countries | A.M. Anderson, FAO |
| R 9 | Developing export markets for New Zealand fishery products | W.T. Allen, New Zealand |
| R 11 | Expansion of export markets in developed countries | L. Birkeland, Norway |
| R 19 | Analysis and characteristics of United States demand for fishery products | R. Whitaker, U.S.A. |
| R 24 | Export markets for fishery products from developing countries | W. Krone, E. Ruckes, FAO |

Experience Papers

| | | |
|---|---|---|
| E 3 | The Japanese experience in developing export markets for fishery products | M. Morisawa, Japan |
| Technical Note 2 | Launching the export of fishery products in Israel | M. Bar-Ilan, Israel |

As was expected, the Session on "Markets" covered a wide range of related subjects, as indicated in the relevant papers for the Session. They examined not only the many considerations which have to be taken into account in connexion with markets but provided a number of excellent practical examples of how markets are developed.

One aspect which was repeatedly stressed was that of marketing. Indeed, some participants suggested that the Session should have been entitled "Marketing". Other aspects also emphasized were quality standards, the problems of promoting exports of fishery products from developing countries, and the worldwide need for more information on markets and marketing to be made regularly available.

Quality standards, it was pointed out, inevitably differ from country to country, and between technically advanced and developing countries, because of differing conditions and situations. For example, permissible toxic levels vary according to species and locations and acceptable levels of contamination vary according to dietary habits and the degree of general contamination, and so on. While it is impossible to draw up a list of quality standards which could be applied throughout the world, some standardization is essential for the continued expansion of international trade in fish and fishery products. It was generally agreed that perhaps the most practical approach to the problem would be standardization based on the definition of the product and restricted to the coverage of well defined products, such as for a group of products based on minced fish and thereafter specific standards for the different variety of such products. It was recognized that the required work in this field was a matter for the Codex Alimentarius programme.

The difference in the degree of enforcement of quality standards in technically advanced as compared with developing countries was made apparent in the discussion. In the former, high quality standards are enforced through control services. In the latter, even where legislation on such standards exists, enforcement is difficult due to the lack of trained staff and quality inspection and control services. It was suggested that FAO should give more attention to such problems. One proposal was that the Organization should arrange meetings of technicians of different countries to draw up a realistic set of values for the control of cooked fishery products and others.

Discussion of the development of export markets for fishery products stressed the importance of overall planning and strategy, based on careful study, investigation and analysis of each market to determine consumer demands, regulations and controls, quality standards, product forms, presentation and price, and so on. Such planning should also take into account production potential relative to future consumption demands, that is, both in regard to the fishing and processing operations.

A point was made that the structure and organization of marketing are weak and fragmented in many countries. It was suggested, therefore, that FAO should undertake specific studies in this field which would assist countries to build up adequate marketing systems.

The recurring concern of the Conference regarding the export of nutritive food products by developing countries where a large number of the population suffer from an inadequate diet was raised again in this Session. The answer to this question, as seen by the majority of participants from both developed and developing countries, is to be found in the overall economic benefit obtained. Thus, exports contribute to a country's economic development, the lack of which is the most significant cause of poverty and malnutrition. Examples were cited of exports of fishery products which have not only earned valuable foreign exchange but have given strong impetus to the growth and industrialization of a country's fisheries. Such trade has benefitted the national economy and led to more and better paid employment for the fishermen and other workers.

It was generally agreed that there is a worldwide need for regular information on markets, products, import regulations, prices, etc., amounting to an international marketing intelligence system. The extensive discussion of this problem led to a suggestion that FAO should consider the best way the Organization could develop a marketing information and data bank for the use of member countries. It was also suggested that FAO should give assistance to developing countries by organizing a series of regional marketing seminars.

## SESSION V

## TRAINING

Chairman: W.H.L. Allsopp, IDRC
Moderator: R.C. Cole, U.K.

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 2 | Training for fisheries products industries in developing countries: requirements and possibilities | R.C. Cole, U.K. |
| R 4 | Establishment of a fish technology laboratory and training centre | P. Hansen, E. Ruckes, FAO |
| R 13 | Manpower requirements and training for fishery product industries | J. Liston, U.S.A. |
| R 23 | Training for fishery product industries | B. Meyboom, Netherlands |

Experience Papers

| | | |
|---|---|---|
| Technical Note 1 | Management training in fisheries | W.P. Appleyard, FAO |

The Session on "Training" served to emphasize the need for training at all levels in fisheries in the developing countries, from that of the artisanal fisherman to that of the managing director of a fisheries organization. But, extensive and urgent as the need is, progress is slow because of the obstacles to the introduction and operation of training schemes on the required scale. These obstacles are, in the main, lack of teachers and instructors, inadequacy or lack of infrastructure, including lack of training facilities in the abundance required, and lack of funds.

The discussions during the Session brought into sharp contrast the situation in the technically advanced countries as compared with that in the developing countries. An excellent example of a fully integrated and adequate training policy and programme was provided by Japan. There are eight universities with a faculty of fisheries. These graduate some 800 students a year in fishing science and technology, aquaculture and food science and technology. A further seven universities have a Department of Fisheries and at the vocational level there are 53 fishery high schools which provide a three-year training course for about 5 000 students each year. Thus, a substantial flow of trained personnel is provided for the fishery industries and services, including research institutes, the extension organization, administration and other governmental bodies. Education in fisheries is further inculcated through seminars for extension workers. The operation of the extension service penetrates all through Japanese fisheries, down to the fishing villages. In addition to this higher and vocational training, the Japanese fishery industries also operate their supplementary training schemes.

As in the case of other technically advanced countries, Japan is also providing training for participants from developing countries. The funds for this activity are provided by the Overseas Fisheries Cooperation Agency (OFCA). As the discussions revealed, countries such as the U.S.A., U.S.S.R., U.K. and others in Europe, are giving increasing aid in this field in view of the overwhelming need for such assistance.

Most of the developing countries are making determined efforts to increase their training facilities but even where training systems or programmes have been established there remains the pressing need for more. And, as many of the countries are striving to develop and industrialize all their fishery operations, the need for training at all levels increases.

A requirement frequently emphasized as an essential element in all training in developing countries was that it should be practical. It was suggested that this could be best achieved at most levels if the training was given in the developing country concerned. Training abroad should be confined to high-level research workers and university teachers. It was pointed out that there is a need in such countries for training and development to be concomitant. Several participants from developing countries, referring again to the need for "practical training", said that this could best be imparted by instructors and trainees working hand-in-hand so that the practical benefits to be derived from the training were demonstrated on the spot.

Special attention was given to training in fish processing. It was stressed that much of the resources of developing countries is wasted because of the lack of knowledge and means to process the fish. There is a need to train people to process fish into products traditionally accepted by the local people rather than attempt to produce entirely new products. Processors, therefore, should be given practical training to do this, taking into account local conditions and requirements, such as religious and cultural attitudes as well as dietary habits and preferences.

In view of the need for training at all levels, there should be a determination of priorities in training. For example, one speaker declared that his country gave first priority to training boat crews and fishermen because any attempt to improve the quality of products must start in the fishing with the catching and handling. The next priority they give to training process plant supervisors and engineers, then the process workers. These exchanges of views and experiences led to the suggestion that FAO could assist developing countries by helping to evaluate training needs region by region and by organizing seminars and courses on training at various levels, and through the provision of more fellowships for training technologists at the higher level. It was also pointed out that there is a great need for manuals, visual aids, boats and equipment and so on for training purposes and that FAO should give more assistance in this field.

Finally, it was recommended that greater efforts should be made to induce the fishery industries in general, and particularly those in the technically advanced countries, to assist in training programmes in developing countries. It was suggested that FAO should investigate these possibilities with Member Governments to find out which industries would participate in such training schemes.

## SESSION VI

## INTERNATIONAL COOPERATION

Chairman: T. Tomiyama, Japan
Moderator: E. Ettrup-Petersen, Denmark

Relevant Papers

Review Papers

| | | |
|---|---|---|
| R 14 | Research and development activities of the International Development Research Centre of Canada in West Africa and the Caribbean | W.H.L. Allsopp, IDRC |
| R 20 | British assistance in the development of fish handling, processing and preservation industries | D.N.F. Hall, N.R. Jones, U.K. |
| R 21 | Some aspects of the role of external aid relative to development of fishery industries | C. Day, FAO |
| R 25 | The role of joint ventures in establishing fishery industries | R. Hamlisch, FAO |

Experience Papers

| | | |
|---|---|---|
| E 52 | A new approach to technical assistance in coastal fisheries | S. Iibuchi, Japan |
| E 56 | Peruvian experience in joint ventures | P. Andersen, W.P. Appleyard, G.H. Hordijk, E.C. Van Noort, FAO J.A. Souness, U.K. |

The relevant papers for the final Session provided two specific examples of assistance in fisheries (by Canada and the United Kingdom) and two papers which reviewed some of the aspects of international aid, such as through bilateral and multilateral assistance and through the very important joint venture approach. The papers led to a wide-ranging discussion covering such subject areas as investment and development, resource potentials, training for development, and quality control and marketing.

One reason for this diversity, of course, is that international aid and cooperation must inevitably be concerned with all aspects involved in the development of fisheries. In these discussions participants showed a keen interest in the restructuring of the Department of Fisheries of FAO which is designed *inter alia* to enable the Organization to play a more direct and intensive role in resource utilization and development. The creation of the Fishery Industry Development Service in the Fishery Industries Division was especially welcomed by participants as making it possible for the Division to generate maximum effort to promote investment, including joint ventures. The cooperation of the new Service with the FAO Investment Centre and with FAO's Industry Cooperative Group, and the establishment of a Unit to promote the development of small-scale inshore or artisanal fisheries, were also welcomed. The general feeling of the participants was that arrangements such as these should enable FAO to give impetus to investment in fisheries development, with emphasis on the involvement of industry in both technically advanced and developing countries in the development process through joint ventures and similar arrangements.

There was considerable interest expressed in FAO's role in joint ventures. This, it was explained, is in the nature of the "honest broker" as and when requested by Member Governments to join in such negotiations. There is likely to be an increasing need for FAO's involvement in this field because joint ventures provide a practical way for speeding up the development process. A particular need in this connexion is a source of finance to pay for the essential identification and formulation missions. This is because the Organization must be able to respond quickly and flexibly to government requests for assistance in this field. It was suggested that such a fund could be derived from support from bilateral and multilateral aid agencies, the international banks, UNDP and other such bodies.

In the discussion on the question of differing views of the partners in joint ventures, it was agreed that the need of industry to obtain an adequate return on its investment and the socio-economic considerations of the governments involved must be resolved to the satisfaction of both partners. While it was felt that the management responsibility should be that of the business partner, it was also suggested that there should be a written undertaking that local personnel would be trained to take over the management of the venture as soon as practical.

The participants generally expressed the view that there is a need for a more aggressive role by FAO in determining the constraints and the possibilities for increased utilization of fishery resources. They suggested that FAO should do more work in this field.

The question of training was referred to frequently and a number of participants described various training schemes in operation in their countries. While it was clear, as stated in the Session on "Training", that the need was urgent at all levels as an essential prerequisite to progress in development, special mention was made of the needs of the small-scale fisheries which, it was pointed out, provide about 90 percent of the catch of food fish in some developing countries. In particular, because of the scattered nature of these fisheries, the fishermen, and other workers in them, especially need training to improve their processing and distribution practices. It was agreed that the most practical way to implement such training is through extension workers, therefore, the strengthening of extension services is an essential requirement.

The participants also dwelt at some length on various aspects of quality control and the increasing need to expand and raise to a higher level the marketing and distribution of all fish and fishery products in these countries. Relative to quality control it was suggested that FAO should request member countries to provide information about their inspection agencies and a list of their relevant Acts and Regulations so that an up-to-date directory can be compiled for the use of all countries. It was also suggested that FAO should compile a directory of fishery research institutions with a notation of their programmes. This could be an extension of the listing already done by the Indo-Pacific Fisheries Council (IPFC) of fishery technological institutes in that region. A further suggestion was that FAO should try to assist developing countries evaluate and programme their work in fisheries, region by region. However, in view of the substantial funds which would be needed for such an ambitious undertaking, it was pointed out that the cost would have to be borne largely by the countries concerned in each region.

## SUGGESTIONS OF THE CONFERENCE

In the course of the discussions a considerable number of suggestions were put forward by the participants regarding activities they felt should be pressed forward for the beneficial development of fisheries throughout the world. In most of these suggestions an appeal was made to FAO to follow them up. As many of the suggestions linked up several fields of work, and in some cases overlapped, it was considered desirable for the purpose of this report to group them under appropriate headings so that a clear view of them could be obtained. The following nine paragraphs, therefore, summarize the recommendations as generally agreed by the Conference.

It should be stressed that the great majority of the recommendations refer to fields of work in which FAO is engaged. The response in these cases will be for the Organization to give increased emphasis to such work where this is feasible. In some cases, however, the follow-up work required would call for additional funds and staff. The activities requiring such support are briefly indicated in the final paragraph (10).

### 1 Fishery utilization

In view of the worldwide need to develop the full potential of fishery resources, the Conference suggested that FAO should continue to review constraints to utilization and propose ways to overcome them. It should pay special attention to the problems of the tropical fisheries by assessing their potential and determining the technology required to realize it. In this context, a number of unsolved questions in the preservation and processing of tropical fish were pointed out and it was suggested that FAO should consider the preparation of a handbook on tropical fish technology. The present status of processing and utilizing minced fish should be reviewed as a matter of priority. FAO should also reinforce its role as a catalyst for information on advances in fish technology for the utilization of fishery resources by establishing procedures for regular consultation with national institutions and for regular dissemination of applied research findings.

### 2 Research

The Conference suggested that FAO should further assist Member Governments in their various research programmes. It should gather information on present experience and programmes of the technological research laboratories which could serve as a guide for intensifying collaboration between these institutions and identifying problems on which research could be carried out on a collaborative basis. Information should also be collected on the programme of Member Governments' inspection agencies with the aim of analysing their function as institutions for control, advice and training.

### 3 Handling and distribution

As there continues to be a great need to improve the handling and distribution of fish, the Conference suggested that FAO should take the necessary steps to emphasize this need, particularly in relation to developing countries. It should give special attention to improved methods and facilities for more efficient handling (at sea and ashore) and distribution of fish, including the application of containerization techniques in handling and transport.

### 4 Fish meal and oil

While supporting the general objective of utilizing marine resources as much as possible for direct human consumption, the Conference concluded that, where fish and other resources cannot be so gainfully used, their conversion into meal and oil makes constructive use of resources which would otherwise remain neglected or underexploited or not harvested at all. FAO should continue to give attention to the processing and marketing of powdered products for direct human use.

5 Marketing

Recognizing the great importance of marketing for the rational exploitation of the world's fishery resources, the Conference urged that FAO should place much more emphasis on market development, including planning and identification of market opportunities and distribution needs in programmes of resource utilization and in all fishery development projects. It was suggested that FAO could provide valuable assistance to developing countries by organizing a series of marketing seminars, region by region. The Conference also proposed that FAO should consider possible ways for developing a market information system for the use of member countries. In this context, it was submitted that there is an urgent need for rapid definition of new product specifications and market requirements.

6 Training needs

The Conference recognized the pressing need in developing countries for training at all levels in fisheries, particularly in fish handling, preservation and processing technology, and suggested that FAO should consider convening an expert working group to study and determine the order of the priorities in training. The Conference also suggested that FAO should encourage established regional training institutes to strengthen their programmes, especially in training at medium and advanced levels in technology, while national training institutions should be encouraged to concentrate on their own specific needs. Further, it was noted that there is a continuing need for instruction manuals, teacher training aids and extension material in the production of which FAO should provide guidance and advice. It was also urged that FAO should encourage greater involvement of industry in training programmes.

7 Product development

While welcoming the growing trend toward development of new products, the Conference stressed the importance of upgrading traditional fish products. In view of the complexity and problems in this field, it suggested that FAO should study the various forms of fish products which could be evolved or upgraded and promote consultations and advice in this respect. Such guidance would be especially valuable to countries which are developing their fishery industries. In particular, attention should be paid to the problem of providing products from tropical fish for the low-income groups of the population in the countries concerned. There is also a need to determine the terminology of new products, such as those made from minced and powdered material, and such terms as FPC and FFP.

8 Assistance in cooperative development

In recognizing that FAO should have an increasing role to play in the development of fisheries in developing countries, the Conference suggested that the Organization should increase its efforts to provide Member Governments, on request, with advice and assistance in the identification of joint venture opportunities, and the preparation, formulation and operation of such ventures. The Conference noted that FAO has under way a series of studies on joint ventures in fisheries and suggested that it should prepare guidelines for joint ventures in fisheries.

9 Funds for opportunity identification

In view of the need for rapid response to government requests and flexible approaches in identification of development opportunities, the Conference urged that funds should be made available to finance identification missions and the technical preparation of fishery investment projects. Support from bilateral aid agencies, the international banks, UNDP and other sources should be enlisted.

10 Suggestions with budgetary implications

Those suggestions which call for new activities by FAO or extend ongoing activities beyond programmed limits, would have budgetary implications. Briefly, these suggestions include those requiring the convening of a Committee of Experts or a Consultative Group or a Working Party; the organization of seminars, training centres, workshops, etc., other than those planned; the employment of expert staff; the production of additional publications, etc.; and the organization and dispatch of identification missions.

## REPORT OF THE AD HOC WORKING GROUP ON COMMINUTED (MINCED) FISH

### TERMS OF REFERENCE

The terms of reference of the group were:

To discuss the gathering of technical data for consideration by FAO of a code of practice for fish blocks made wholly or in part from comminuted (minced) flesh of fish and shellfish.

### PROCEEDINGS

The discussion in Session II, Section 2, on the processing of fish raised the question of whether a standard should be developed for blocks made from minced fish. It was recognized that this was a very complex matter, in view of the great variety of fish and parts of fish used, and because of the many ways in which this material is extracted. While the technology of comminuted fish is still largely in the development stage, many countries are now making consumer products with this material and are selling it internationally. It was felt, therefore, that this experience should be gathered and conveyed to FAO for coordination and for the possible development of a code of practice.

A group (see page 8), chaired by Dr. C.M. Blackwood, met at noon on Thursday, 6 December 1973, to identify the subject headings under which present experience and technological data might be assembled and suggested the following divisions:

1 Raw material: Examples: whole fish, fillets, species (common and scientific name), mixed species, fish frames, mixtures of fillets and minced material, fish not suitable for normal processing.

Note: It was suggested that some research be undertaken to determine the suitability of raw material of this character, e.g., jellied or chalky flesh.

2 Method of manufacture: Examples: a brief description of the types of machines used and methods employed in the manufacture of the product.

3 Product composition: Examples: water, protein, fat, ash, sugar, salt.

Note: Methods of analysis should be given.

4 Quality criteria: Examples: colour, odour, flavour and texture, FFA, TBA, volatile acids and bases, bone, chitin, parasites, storage life.

Note: It was suggested that a complete list of parasites found and methods of their identification in minced flesh should be submitted. Views on the presence and levels of parasites should also be included.

5 Microbiology: Examples: bacteriological counts and problems.

6 Additives: Examples: phosphates, antioxidants, sodium glutamate, starch, stabilizers.

Note: Technological justification should also be given for any additives, together with their levels of use.

7 Product labelling: Examples: country policy and practice.

### RECOMMENDATION

The group suggested that a request be circulated by FAO to Member Nations for information on the manufacture and character of minced fish flesh. The group prepared a list of headings for FAO to use for this purpose. When the information has been gathered by FAO and coordinated, it should be sent to Member Nations for distribution to the technical laboratories as a guide for identifying problems on which further research may be required.

MEMBERS OF THE GROUP

| | |
|---|---|
| Blackwood, C.M. | Canada (Chairman) |
| Wilson, D.D. | Canada (Rapporteur) |
| Amano, K. | Japan |
| Bligh, E.G. | Canada |
| Boshell, R.M. | U.S.A. |
| Burgess, G.H.O. | U.K. |
| Drews, J. | Germany, Federal Republic of |
| Finch, R. | U.S.A. |
| Gomes, F. | U.S.A. |
| Hansen, P. | FAO |
| Heen, E. | Norway |
| Hunt, R. | Australia |
| James, D.G. | Australia |
| Karnicki, Z.S. | Poland |
| Learson, R.J. | U.S.A. |
| Okada, M. | Japan |
| Pensabene, F. | Australia |
| Rekhina, N.I. | U.S.S.R. |
| Steinberg, M. | U.S.A. |

Appendix 1

ADDRESS

by

Mr. T. Kamenaga
Vice-Minister of Agriculture of Japan

Mr. Chairman, Deputy Director-General Jackson, Ladies and Gentlemen,

I am greatly honoured to have been given the opportunity of addressing you as a representative of the host country at this opening of the FAO Technical Conference on Fishery Products.

It is indeed a great pleasure to have here today, at this promising start of the Technical Conference on Fishery Products, more than 200 representatives from 50-odd nations and five international organizations, and I would like to use this occasion to welcome you all most warmly. In the six days of this Conference I feel certain that, through the various proceedings in which we will all take part, a significant contribution will be made to processing technology of the world's fishery products and thus to the development of the world's fishing industries.

The Japanese are a people that consume fishery products in great quantities. The seafoods that find their way on to our dining tables run the whole gamut from fishes to seaweeds and, in the form of product as well, there is great variety covering the full range of possibilities from, to take fish as an example, raw fish, or what we call "sashimi", to fish which has been processed and canned. And, in respect of the quantity consumed, even a person who only eats a little will have at least one fish dish a day; other people who eat more may consume two or even three kinds of fishery products at each meal.

Recently, the people of Japan have taken to overseas travelling in increasingly greater numbers and one complaint that is almost universally voiced by them while they are abroad is that they are not able to eat as much fish as they would like. When you return to your own countries, and if you should chance to meet some Japanese travellers, I am confident that, with few exceptions, you could make them happy by introducing them to a restaurant serving fish dishes.

You may view for yourself the close association between the Japanese people and fish and fishery products if you but venture outside along some of Tokyo's streets. Numerous restaurants and food stalls crowd the streets. For the most part, these establishments specialize in or have fish dishes available and the choice of fish dishes is also correspondingly varied. Alternatively, if you happen to pass the fishery product section of a department store or supermarket, no doubt you will be surprised by the great variety of products sold.

Japan is said to have the world's foremost fishing industry, and the basis of the industry's development is precisely this fondness of the people for fish. From this we may understand that fish processing technique developments which meet the fancy of the Japanese people will play an important role in the expansion of the fishery industry.

In this regard, it seems to me that Japan can in this sense serve as a useful reference point for your own countries. In addition to the high-level discussions of a scientific and technical nature that will take place during the Conference, I feel you can also profit by observing for yourself just what is the place held by fishery products in the life of the Japanese people, one of the world's leading fish-consuming people. Is not this, after all, perhaps one of the reasons why FAO elected to hold this Technical Conference on Fishery Products here?

Some inspection activities, during the Conference and for the period after the Conference, have been planned that I hope may be useful in introducing you to some aspects of Japan's fishery processing industry and the Japan Fisheries Association has sponsored a fishery product exhibition in the expectation that some of you may wish to visit it. Although perhaps we have not done as much along this line of preparation as we might have, if any of this proves useful to you I shall be delighted.

In December Tokyo's weather begins to cool off significantly and, particularly for those of you who are coming here from warmer, southern climes, I fear that the temperature may be uncomfortably cold. But, as the year is drawing to a close, the streets are at least full of life and activity. I know the Conference schedule will keep you quite busy but you will be well rewarded if you can stroll down these streets in your free time. Even though, in many respects, there is much of a cosmopolitan, international character about these streets, I expect you will also encounter a typically Japanese atmosphere which is absent from other large cities abroad. Let me close my greetings with the wish that your stay here will be both enjoyable and memorable.

Thank you.

Appendix 2

ADDRESS

by

The Chairman, Mr. I. Arakatsu
Director-General
Fishery Agency of Japan

Mr. Deputy Director-General of the FAO, Mr. Vice-Minister, Secretariat, Ladies and Gentlemen,

It is my great honour to have been chosen to act as Chairman at this FAO Technical Conference on Fishery Products.

First of all, let me say that I am delighted to see such a good representation here from abroad and allow me to express my profound gratitude for your efforts in connexion with the holding of this Conference.

The fishery industry is growing in global importance as an industry supplying indispensable animal protein foods. Demand for its products is expected to continue increasingly rapidly. In fact, according to FAO estimates, it will soon reach about 120 million tons, or nearly twice the present production. In order to meet such expectations, the industry will have to continue its efforts to make more efficient use of the fishery resources than have already been developed and also develop new resources through international cooperation.

With such being the case, it seems to me that this is a very propitious time to have so many experts in so many different fields gather together here to discuss the development of fishery products and related problems, and I am sure that this Conference will make a very substantial contribution to the future development of the fishery industry throughout the world.

Japan has the largest fishery industry in the world, with a production of more than 10 million tons in 1972. Basically, the reason for this is the fact that the Japanese eat more fish and other seafoods than almost any other people. Furthermore, they have long depended on such foods for protein and have eaten a very considerable amount of such products both collectively and individually. The range of seafoods which they have eaten has been very wide indeed including - besides the types of fish generally eaten throughout the world and shrimps, lobsters and crabs - whale meat, squid and lobster, sea urchins and sea slugs, and even various kinds of seaweeds. Moreover, there is a great variety of ways in which these seafoods are processed and used. Some traditional favourites are flaked bonito, which is dried and smoked before flaking; "kamaboko", a kind of fish cake; and "nori" a type of processed seaweed. Then there are products such as "fish sausage" which are newcomers to the Japanese menu in recent years. I am sure that many of these products of ours will be of great interest to you.

In order to meet this growing demand for seafoods, we in Japan are developing our fishery industry beyond traditional forms. We are putting considerable efforts into cultivation of fish, shellfish and seaweeds as well as raising fry in nurseries and releasing them into the sea when they have developed enough to stand a good chance of survival on their own so as to stretch to the full the natural productive capacity of the world's oceans. Although you may not be directly concerned with such activities, they are of paramount importance to the future development of the fishery industry throughout the world from the standpoint of putting existing seafood resources to full use and actively developing new ones. In this connexion as well, I think Japan has much that will be of considerable interest to you. As Vice-Minister Kamenaga has already pointed out, you will have every opportunity to see for yourselves, during and after the Conference, actual conditions in Japan today with regard to the fishery industry and fishery products, and I hope you will fully avail yourselves of such opportunities.

Allow me once again, in closing, to stress the significance of this FAO Technical Conference on Fishery Products, a significance that is accentuated by the present-day need for international cooperation in developing and preserving the fishery resources of the world and promoting the more effective use of what is already being caught. I hope that you will take advantage of this rare opportunity to have a meaningful exchange of views on many pertinent problems both at the Conference Sessions and between them so as to make a significant contribution to the development of the global fishery industry.

Last of all, as Chairman, I would like to express the hope that this Conference will be a great success and that all of you will enjoy your stay here in Japan.

Thank you.

Appendix 3

KEYNOTE ADDRESS

by

Mr. Roy I. Jackson
Deputy Director-General
Food and Agriculture Organization of the United Nations

at the Opening Session

Mr. Chairman, Honourable Minister, Distinguished Participants, Ladies and Gentlemen,

This is an occasion of great personal pleasure for me for several reasons. The first because it brings me back to Japan. As many of you are aware, my association with Japan started many years ago - long before I joined FAO - so that I have many friends here and many ties with this beautiful country and its hospitable people.

The second reason is that the occasion brings me back again among my friends and colleagues in fisheries. After a lifetime spent in such an absorbing field of work and in such interesting company, one can never forget those years and the experience of working in fisheries no matter how demanding the call of duty elsewhere.

The third reason is that, in delivering this Keynote Address, I am given an opportunity to draw your attention to some of those fields of activity in fisheries which we in FAO consider to be of priority and which will be the subject of some of your major deliberations. But, before so doing, there is a final reason for my pleasure in being here, that is, to express on behalf of the Director-General of the Food and Agriculture Organization of the United Nations his gratitude to the Government of Japan for their invitation to hold the Conference in Tokyo. We are most grateful for all that has been done in providing the facilities, services and personnel essential for the successful operation of the Conference. I should also like to extend our thanks to the fishing industry of Japan for its cooperation and help in arranging the instructive tours of the industry and for the interesting exhibition they have staged at this Conference.

Mr. Chairman, a Keynote Address should provide an overall view of the Conference and highlight those critical areas and problems which are to be discussed and, hopefully, to indicate what can be achieved through such a gathering. This Conference presents the culmination of FAO's policy and programming in this field over the past two decades or more. During this period we have sought to bring about improvements in standards of hygiene and quality of products essential for the progress of the industry throughout the world and especially in the developing countries. Our progress can be traced through the products conferences we have organized in the past: Fish in Nutrition, held in Washington, D.C., U.S.A. in 1961; Fish Utilization, held in Husum, Federal Republic of Germany in 1964; Freezing and Irradiation of Fish, held in Madrid, Spain in 1967; and Fish Inspection and Quality Control, held in Halifax, Canada in 1969. Each of these conferences dealt with a specific technical aspect of fish as a food product. As those here today are aware, during this period the problems confronting the fishing industry in general have become more complex, and in no sector more so than in fishery products. This Conference, therefore, comes at a critical time for the industry, a view widely shared throughout the world. Indeed, the need was reflected in the course of the important FAO Technical Conference on Fishery Management and Development, held in Vancouver, British Columbia last February at the invitation of the Government of Canada.

Once the decision was made to hold this products conference, Japan was obviously the most desirable venue. Here, where some 50 percent of animal protein consumed by the people comes from fish and other marine animals, and where almost everything to be harvested from the sea is used, there is an age-old tradition in making fishery products. And to this tradition has been harnessed all the skills and inventiveness of modern science and technology. In this country, therefore, there is a greater variety of fishery products to be seen than anywhere else, concrete examples for participants to view. There is richness not only in product development but in the whole of the Japanese fishing industry, ranging from an intensive aquaculture and small-scale inshore fishery to the highly organized and complex distant-water fishing. Further, the organization of fishing, particularly with the unique and sophisticated licensing system based on social, economic and technical considerations, provides many useful lessons for all other fishing nations.

Without dwelling too much on these aspects, I think it is important to the participants of this Conference to realize that, as Mr. Hisamune, President of the Japan Marine Fishery Resources Research Centre, pointed out at the April meeting of FAO's Committee on Fisheries, more than 99 percent of Japanese fishery enterprises are concerned with coastal and small and medium off-shore fisheries. These account for some 65 percent of total landings and about 83 percent of the value of all landings. Some 70 percent of the fishing population of Japan is engaged in these fisheries, and the income of the fishing family exceeds that of the Japanese farming family by 10 percent, and of the urban worker's family by 12 percent.

Mr. Chairman, I shall now take a quick look at the agenda of the Conference and comment briefly on some of the main subjects you will be discussing. As you know, there will be six Sessions at which a total of more than 70 papers will be presented as well as a number of notes to stimulate discussion, an important feature of the Conference. The Opening Session will set the stage for the ensuing Sessions by taking a broad and deep view of fishery products and their development in various parts of the world, including the potential for the development of the fishery products industry.

The next Session has a wide and varied range of papers covering present products and trends which will be discussed in three Sections - handling and preservation, processing, and tropical fish and aquaculture. You will note that many of the papers deal with catching, handling and processing fish and other stocks, outside the main familiar and popular species. This seems to me to go to the heart of one of the main issues facing fisheries today how best to utilize new types of raw material - and I should think that a good deal of the discussion will centre around the possibilities of adapting this raw material to known products and processes. At the same time, of course, we shall have to remember that the traditional products, especially in developing countries, will continue to provide the bulk of the supplies and that the pressing need remains to improve their handling, preservation and processing, with special attention to hygiene and quality control. If we could achieve these aims we could increase food fish supplies from the present catch by 25 percent or more in many countries.

I am sure you will also discuss in considerable detail the many problems associated with the catching, handling and utilizing of tropical fish. In this connexion, I hope that the need to collect and analyse data on all aspects of tropical fisheries will be stressed because without adequate information we cannot organize effective exploitation of this rich resource.

Session III provides another very wide range of papers which will be dealt with in two sections. The first embraces the general theme of product development and opportunities while the second is concerned with composite, compounded and comminuted products. Many of the papers, and the development trends they indicate, point to expanding fields of work for FAO. For example, much more work needs to be done on the subject of fish as a low cost food. Perhaps the use of fish in this way could be achieved best through powdered products and many of the unfamiliar species could, perhaps, be best processed in such ways in order to increase their acceptability. No doubt in the discussions much attention will be given to the possible role of the fish meal industry. This Conference provides us with a chance to examine that role critically and to see how and in what ways the industry can contribute to the build-up of the fishery products industry in developing countries.

I note, Mr. Chairman, that the question of fish oils will be discussed. This is a field in which, as we know, much work needs to be done, such as much more research is needed to make possible their use as fluid oils, such as for use in salads, and the enlargement of their use for medicinal purposes.

The next Session deals with markets, so often a neglected or under-rated subject in fishery discussions. I hope that this Conference will avoid such an error because marketing will, more than ever, play a key role in the introduction to the dinner table of new and unfamiliar species.

While it is generally agreed that people do not easily change their food habits, there are many developments which point to the fact that they do change and will change given the right kind of persuasion. This is largely a task for marketing. I should like to quote a significant statement made by Mr. Hisamune at the COFI meeting I have already referred to. In talking about the almost revolutionary changes in the diet of the people of Japan, particularly following the social and economic reforms introduced in the past two decades, he said: "What I have tried to stress in telling you all this is that tastes and customs, however deep-rooted they may be, can still be changed by social or economic factors. This is very important." I am sure that everyone would agree with this sentiment and that it will be kept firmly in mind by the participants throughout this Conference.

Training, which is the subject of the fifth Session is, in one sense, the most essential requirement for the development of the fishery industry generally and the fishery products sector in particular, especially in the developing countries. This has long been a dominant feature of FAO's thinking and work in fisheries development. It will continue to be so for as long as there is a need for fishermen to acquire skills and knowledge at any level in their industry.

The final Session is devoted to international cooperation with special reference to external aid and the collaboration of industry through joint ventures and similar cooperative arrangements. It is often asserted that not enough international aid is available. Perhaps it would be more to the point to say that not enough effective and efficient use is made of the aid available. This Conference, which brings together so many people from all parts of the world, provides a unique opportunity to discuss this complex matter in depth and to point out to both donor and recipient. Both partners in development are well represented here and can discuss, on the basis of actual experience, what should be done to ensure successful utilization of international aid programmes.

On this subject there is, Mr. Chairman, one all-important point which should be stressed. This is the role and responsibilities of the developing countries themselves. The development of their fisheries, including their fishery products industry, cannot be achieved for them because it is a process that amounts to more than the provision of funds, know-how and physical inputs. The essential requirement is that the governments of the developing countries are themselves fully committed to such development, that they adopt the appropriate policies and programmes and provide the funds and other inputs required to implement these policies and programmes. Then, and only then, can international aid be really effective in assisting these countries to achieve the long-term and continuous development of their industry. This essential prerequisite should, I believe, be boldly stressed by this Conference.

One word more about international aid. This is the role which FAO can play in promoting international cooperation and collaboration in fisheries development by acting as the "honest broker" who brings together donor and recipient countries.

In this respect I should draw your attention to the establishment of an international investment and development service in the Fishery Industries Division. This new service is designed to meet the increasing needs of the developing countries to plan and carry out the rational development of their fishery industries, a point much stressed at the Vancouver Conference. This subject will no doubt be thoroughly examined in your discussions and featured in your recommendations.

In conclusion, Mr. Chairman, I wish to reiterate that we are at a critical stage in the development of fisheries. We already contribute some 70 million tons of fish and fishery products to the world - as compared, for example, to the contribution of 84 million tons of meat - and we hope to increase our protein-rich contribution by perhaps another 35 million tons or more. But, to make the bulk of these products available and acceptable for direct human consumption, we shall need to use all our ingenuity and inventiveness in preservation, processing, product development and marketing, especially as we shall be largely utilizing unfamiliar species of fish and other marine animals. And, as the new fisheries are mostly to be found in the waters adjacent to the developing countries, and as these countries wish to derive their share of the benefit from this new resource, it is here that major efforts will be concentrated.

These are but a few of the reasons why your Conference is of worldwide significance. It offers you, Mr. Chairman and Distinguished Participants, the opportunity to provide clear guidance in respect of the fishery products industry which will contribute significantly to economic and social progress in the developing countries.

Mr. Chairman, I wish you and all participants well in your discussions and deliberations.

Thank you.

Appendix 4

ADDRESS

by

Mr. Herman Watzinger
Director of the Fishery Industries Division
Food and Agriculture Organization of the United Nations

at the Closing Session

Mr. Chairman,

We have now come to the last few minutes of this Conference and it is my very pleasant duty to express, on behalf of the Director-General and all of us in FAO, our gratitude to all those who have helped to make this meeting the success it has clearly been.

In the first instance, our thanks are extended to our hosts, the Government of Japan, for all the arrangements they have made to ensure the smooth and efficient conduct of the Conference. We could not have asked for a better venue than this handsome building so admirably equipped with all the facilities needed for such a meeting as ours. But, apart from these physical contributions to our well being, I should like to pay a special tribute to our Japanese colleagues deputed to work with us in running the Conference. Their willingness to work through long hours with good humour and efficiency has enabled us to meet the heavy secretarial demands of the meeting. In this connexion, I should say how happy we have been to work again with our old friend Mr. Mimura who is well known to us through his duty tour in Rome. And, in particular, I should express our gratitude to those ladies who, despite the hard work, always managed to be graceful and charming.

I am glad to have this opportunity to express our thanks to Mr. Arakatsu, Director-General of the Fisheries Agency, for chairing this Conference despite the heavy demands on his time, and to you, Mr. Chairman, for taking over the chair for this final Session, and to Mr. Amano, not only for functioning as our Moderator for this concluding Session but for all his advice, guidance and work in making arrangements for this Conference.

We are very grateful too to the Japan Fisheries Asoociation for their support and cooperation, in particular for organizing such a comprehensive exhibition and visits to industries. It gave us a wide view of the modernized character and efficiency of the Japanese fishing industry.

I have also a special pleasure in thanking the Japan Fisheries Association and the Fisheries Agency for the magnificent receptions they held for us. If anybody had any doubt as to the enormous range and variety of sea foods, these receptions must have dispelled them. They proved beyond dispute that Japan leads the world in fishery product development, both as to variety and quality.

So, in conclusion, Mr. Chairman, let me say that all of us in FAO - including our largely invisible but very hard working interpreters - have thoroughly enjoyed our stay in Tokyo and leave this bustling and lively city with the hope that you will invite us again in due course to hold another meeting here.

Appendix 5

LIST OF PARTICIPANTS

Algeria

KERKEBANE, M.
Directeur général adjoint
Office algérien des Pêches
1 Place de la Pêcherie
Algiers

Argentina

TOGNETTI, O.H.
Tecnólogo en Procesamiento de Pescado
Proyecto de Desarrollo Pesquero
Casilla de Correo 288
Mar del Plata

Australia

DAVIS, P.
Fish Exports Standards Officer
Fisheries Division
Department of Primary Industry
Canberra, A.C.T. 2600

HARRISON, R.D.
Managing Director
Craig, Mostyn & Co. Pty Limited
1 Essex Street
Fremantle, Western Australia 6160

HUNT, R.
Managing Director
Hunt's Canning Company Pty Limited
P.O. Box 104
Albany, Western Australia 6330

JAMES, D.G.
Food Technologist
Tasmanian Regional Laboratory
Division of Food Research
Commonwealth Scientific and Industrial
Research Organization (CSIRO)
Stowell Avenue
Hobart, Tasmania 7000

MOSTYN, R.M.
Managing Director
Craig, Mostyn & Co. Pty Limited
Box 5295 GPO
Sydney, N.S.W. 2001

PENSABENE, F.
Manager
Fisheries Division
W. Angliss Co. (Aust.) Pty Limited
255 George Street
Sydney, N.S.W. 2000

Bangladesh

YOUSSEF ALI, D.M.
Joint Secretary
Ministry of Fisheries, Forests and Livestock
Dacca

Bolivia

QUIROGA, Dr. J.E.
Ministro-Consejero
Embajada de Bolivia
Ambassador Mansion 101
18-2 Kamioosaki 1-chome
Shinagawa-ku
Tokyo, Japan

YOSHIDA, Excmo. Sr. D. Armand
Embajada de Bolivia
Ambassador Mansion 101
18-2 Kamioosaki 1-chome
Shinagawa-ku
Tokyo, Japan

Brazil

BEZERRA E SILVA, J.W.
Director
Centro de Pesquisas Ictiologicas do DNOCS
Rua Carlos Vasconcelos 1419
60 000 Fortaleza, Ceará

BRITTO DE CASTRO, L.A.
Biologista de Pesca
Instituto de Pesca, DPM
CP 1070
11 100 Santos, SP

FONTENELE, O.
Assessor de Pesca e Piscicultura do DNOCS
Rua Duque de Caxias 1700
CP 650
60 000 Fortaleza, Ceará

LOUSHIN, L.L.
Convenio DPAN
Rua Carlos Vasconcelos 1419
60 000 Fortaleza, Ceará

VAZ PINTO, R.
Economist
SUDEPE
Edificio da Pesca
Praça XV de Novembre
Rio de Janeiro, Guanabara

Burundi

NGOMIRAKIZA, M.
Directeur
Département des Eaux et Forêts
Ministère de l'Agriculture et de l'Elevage
B.P. 1850
Bujumbura

Cameroon

EPEE-NGOUBE, Dr. T.
Directeur des Pêches maritimes
B.P. 121
Douala

Canada

ACKMAN, Dr. R.G.
Program Manager, Marine Lipids
Halifax Laboratory
Fisheries and Marine Service
Department of the Environment
P.O. Box 429
Halifax, Nova Scotia B3J 2R3

BARBOUR, D.H.
Manager
Quality Control and Product Development
British Columbia Packers Limited
P.O. Box 5000
Vancouver 3, British Columbia

BLACKWOOD, Dr. C.M.
Director
Inspection Branch
Fisheries and Marine Service
Department of the Environment
Ottawa, Ontario K1A OH3

BLIGH, Dr. E.G.
Laboratory Director
Halifax Laboratory
Fisheries and Marine Service
Department of the Environment
P.O. Box 429
Halifax, Nova Scotia B3J 2R3

DREBOT, M.A.
Product Development Officer
Nova Scotia Department of Fisheries
Box 2223
Halifax, Nova Scotia

JOHN, J.
Manager
Marketing Services Division
Fisheries and Marine Service
Department of the Environment
Ottawa, Ontario K1A OH3

MOSS, P.
President and General Manager
Freshwater Fish Marketing Corporation
1199 Plessis Road
Winnipeg, Manitoba R2C 3L4

SAVOIE, J.B.R.
Director
Fish Inspection and Marketing Branch
Department of Fisheries and Environment
Centennial Building
Fredericton, New Brunswick

SPENCER, F.K.
Newfoundland and Labrador Development
Corporation
P.O. Box 1738
St. John's, Newfoundland

STANTON, A.J.
Director
Agriculture, Fisheries and Food Products Branch
Department of Industry, Trade and Commerce
Ottawa, Ontario

VAGNEUX, P.J.
New Brunswick Research and Productivity Council
P.O. Box 1236
Fredericton, New Brunswick

WILLMER, Dr. J.S.
Program Coordinator, Products and Processing
Research and Development Directorate
Fisheries and Marine Service
Department of the Environment
Ottawa, Ontario K1A OH3

WILSON, D.D.
Manager
Inspection Branch
Pacific Region
Department of the Environment
1090 West Pender Street
Vancouver 1, British Columbia

Central African Republic

KOMBOT-NAGUEMON, Son Excellence M. Nestor
Ambassadeur extraordinaire et pléni-
potentiaire de la République
centrafricaine au Japon
Ambassade de la République centrafricaine
11-43 Akasaka 8-chome
Minato-ku, Tokyo, Japan

Chile

ARATA ANDREANI, N.N.
Universidad Católica de Valparaíso
Avenida Brasil 2950
Valparaíso

BASAURE VALDIVIA, L.A.
Jefe, Unidad Pastas y Embutidos
Instituto de Fomento Pesquero
Avenida Pedro de Valdivia 2633
Santiago

TARKY, Prof. W.
Universidad Católica de Valparaíso
Avenida Brasil 2950
Valparaíso

Colombia

GONZALEZ BARROS, Excmo Sr. D. Luis
Embajador Extraordinario y Plenipotenciario
Embajada de Colombia
3-10 Kamiosaki
Shinagawa-ku, Tokyo, Japan

ZARATE REY, Dr. N.
Consejero Comercial
Embajada de Colombia
3-10 Kamiosaki
Shinagawa-ku, Tokyo, Japan

Cuba

BLANCO ALVAREZ, M.
Jefe, Investigación Desarollo Industrial
Instituto Nacional de la Pesca
Enseñada de Pote y Atares
Puerto Pesquero
Havana

RAMIREZ GUTIERREZ, N.
Agregado de Pesquerías
Embajada de Cuba
12-11 Roppongi 5-chome
Minato-ku, Tokyo, Japan

SUGIYAMA, A.
Interprete
Embajada de Cuba
12-11 Roppongi 5-chome
Minato-ku, Tokyo, Japan

Denmark

AAGAARD, J.
Managing Engineer
The Royal Greenland Trade Company
Strandgade
DK-1401 Copenhagen K

ETTRUP-PETERSEN, Dr. E.
A/S Atlas
Baltorpvej 154
DK-2750 Ballerup, Copenhagen

HERBORG, L.
Acting Chief
Technological Laboratory
Ministry of Fisheries, Building 221
Technical University
DK-2800 Lyngby

HOLM-CHRISTENSEN, B.
Superfoss A/S
Frydenlundsvej 30
DK-2950 Vedbaek, Copenhagen

IKKALA, P.
Chemical Engineer
Technological Laboratory
Ministry of Fisheries, Building 221
Technical University
DK-2800 Lyngby

KITAGAWA, T.
Representative of A/S Atlas in Japan
Director, Wolhardt Brothers (Japan) Ltd
Fuji Building
1-Talaracho 1-chome
Chuo-ku, Tokyo, Japan

OLSEN, B.
A/S Atlas
Baltorpvej 154
DK-2750 Ballerup, Copenhagen

Ecuador

ALVAREZ, A.
Segundo Secretario
Embajada del Ecuador
19-13 Minami Azabu 3-chome
Minato-ku, Tokyo, Japan

France

SOUDAN, Dr. France
Chef
Service de la Technologie et des Contrôles
Institut scientifique et technique des
Pêches maritimes
La Noe
Route de la Jonelière
44 Nantes

Germany, Federal Republic of

BERTRAMS, B.
Ministerialrat
Bundesministerium für Ernahrung,
Landwirtschaft und Forsten
Bonnerstr. 85
53 Bonn-Duisdorf

CHRISTIANS, O.
Bundesforschungsanstalt für Fischerei
Institut für Biochemie und Technologie
Palmaille 9
2000 Hamburg 50

DIESTEL, J.J.
Director
Nordischer Maschinenbau Rud. Baader
Postfach 1102
D-2400 Lübeck 1

DREWS, J.
Nordischer Maschinenbau Rud. Baader
Postfach 1102
D-2400 Lübeck 1

Guyana

CLARKE, Dr. R.
Food Coordinator
Food Processing Development
Ministry of National Development and
Agriculture
Regent and Vlissengen Roads
Georgetown

PETERKIN, F.A.
Manager
Seafoods Division
Guyana Industrial Holdings Limited
19 Water Street
Georgetown

TAMAYA, P.
Managing Director
Guyana Industrial Holdings Limited
19 Water Street
Georgetown

Iceland

MAGNUSSON, J.R.
Manager
Icelandic State Herring Oil and
Meal Factories
Reykjavik

India

JAYARAJ, M.
Managing Director
Mysore State Fisheries Development
Corporation Ltd
Mangalore 1, Mysore State

Indonesia

ILYAS, S.
Director
Fishery Technology Institute
Satsuit Tubun
Palmerah
Jakarta

SUSANTO, V.
Director
Resources Protection and Conservation
Directorate-General of Fisheries
Department of Agriculture
Jalan Salemba Raya 16
Jakarta

Iraq

AL-WANDAWI, His Excellency M.T.
Ambassador
Embassy of Iraq
1-21 Higashiyama
Meguro-ku, Tokyo, Japan

Italy

ALOFS, M.J.M.
Technical Director
Algel-Findus S.p.A.
Piazzale del Caravaggio 2/B
00147 Rome

DE LEON, Dr. L.
Deputy Director-General of Marine Fisheries
Ministry of Merchant Marine
Viale Asia
00144 Rome

Ivory Coast

COFFI, Son Excellence M. Pierre Nelson
Ambassadeur
Ambassade de Côte-d'Ivoire
Aoyama Tower Building 24-15
Minami Aoyama 2-chome
Tokyo, Japan

DOUGBO, A.J.
3ème Secrétaire
Ambassade de Côte-d'Ivoire
Aoyama Tower Building 24-15
Minami Aoyama 2-chome
Tokyo, Japan

Japan

AMANO, Dr. K.
Director
Tokai Regional Fisheries Research
Laboratory
Fishery Agency
Ministry of Agriculture and Forestry
Kachidoki 5-chome
Chuo-ku, Tokyo 104

ARAKATSU, I.
Director-General
Fishery Agency
Ministry of Agriculture and Forestry
2-1 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

ARRI, S.
Chairman
Japan Fishmeal Association
2-18 Marunouchi
Chiyoda-ku, Tokyo

DAITA, K.
Chairman
Japan Overseas Shrimp Fishery Association
22-9 Nishishinbashi 1-chome
Minato-ku, Tokyo

FUJITA, I.
President
Japan Fisheries Association
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

HANADA, T.
Manager
Food Production Division
Nippon Reizo Kabushiki Kaisha Co. Ltd
2-7 Kyodo 5-chome
Setagaya-ku, Tokyo

HASHIMOTO, Prof. Y.
Department of Fisheries
Faculty of Agriculture
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

HAYAKAWA, T.
Deputy Head, Specialized Agencies Division
United Nations Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

HIRAO, S.
Head, Biochemistry Division
Tokai Regional Fisheries Research
Laboratory
Fishery Agency
Ministry of Agriculture and Forestry
Kachidoki 5-chome
Chuo-ku, Tokyo 104

HISAMUNE, T.
President
Japan Marine Fishery Resources
Research Centre
Mandai Building
4-4 Kojimachi
Chiyoda-ku, Tokyo

ICHIKAWA, H.
Managing Director
Overseas Fishery Cooperation Foundation
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

ICHIOKA, K.
Head, Specialized Agencies Division
United Nations Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

IIJIMA, Y.
Senior Officer
Northern Division
Hokoku Marine Products Co. Ltd
9-13 Tsukiji 7-chome
Chuo-ku, Tokyo

IINO, K.
International Economy Division
Economic Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

IIYAMA, T.
Chairman
Committee on International Affairs
Japan Fisheries Association
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

IKEDA, A.
Specialized Agencies Division
United Nations Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

IKEJIRI, B.
Executive Director
National Federation of Fisheries Cooperatives
Cooperatives Building
1-12 Uchi-kanda 1-chome
Chiyoda-ku, Tokyo 100

ISHII, S.
Vice-President
Hayashikane Shokuhin Kogyo Co. Ltd
3-4 Echujima 1-chome
Koto-ku, Tokyo

KAKOI, S.
Executive Director
Hoko Fishing Co. Ltd
2-4 Tsukiji 1-chome
Chuo-ku, Tokyo

KAMOGAWA, Y.
President
National Federation of Fishery Processors' Cooperative Association
9340 Hazaki
Ibaragi-ken

KANEDA, Dr. T.
Department of Food Chemistry
Faculty of Agriculture
Tohoku University
Sendai

KANEKO, K.
President
Youth Council
National Federation of Kneaded Fish Products Processing Cooperatives
24-2 Nakamachi 2-chome
Setagaya-ku, Tokyo

KAWABATA, Dr. T.
Head, Laboratory of Food Microbiology and Toxicology
Department of Biomedical Research on Food
National Institute of Health
Ministry of Health and Welfare
2-2 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

KONOSU, S.
Assistant Professor
Department of Fisheries
Faculty of Agriculture
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

MASUDA, S.
President
Federation of Japan Tuna Fisheries Cooperatives
3-22 Kudankita 2-chome
Chiyoda-ku, Tokyo

MASUMITSU, J.
Director
Fishery Administration Department
Fishery Agency
Ministry of Agriculture and Forestry
2-1 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

MATSUMOTO, Dr. J.J.
Professor
Department of Chemistry, Science and Technology
Sophia University
Yotsuya
Shinju-ku, Tokyo

MATSUMOTO, T.
Managing Director
Japan Deep-sea Trawlers Association
Daito Building
6 Kanda-Ogawacho 3-chome
Chiyoda-ku, Tokyo

MATSUSHITA, Dr. T.
Director
Research and Development Department
Fishery Agency
Ministry of Agriculture and Forestry
2-1 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

MIHARA, S.
Deputy Manager
Chief of Technical Group
Processed Food Division
Taiyo Fishery Co. Ltd
1-3 Echujima
Koto-ku, Tokyo

MIZOGUCHI, A.
Production Manager
Kyokuyo Co. Ltd
9-9 Kamiikedai 3-chome
Ota-ku, Tokyo

MORISAWA, M.
Executive Director
Japan Fisheries Association
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

MOTOHIRO, Dr. T.
Assistant Professor
Faculty of Fisheries
Hokkaido University
1-1 Minato-cho 3-chome
Hakodate, Hokkaido

NAKAMURA, I.
Director
International Fisheries Affairs
Department
Japan Fisheries Association
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

NAKAMURA, T.
Executive Director
Japan Fisheries Association
Sankaido Building
9-13 Akasaka 1-chome
Minato-ku, Tokyo 107

NAKANO, S.
Manager
Business Department
Hakodate Kokai Gyogyo Fishing Co. Ltd
3-9 Shimbashi 1-chome
Minato-ku, Tokyo

NATORI, M.
President
National Federation of Dried Squid
Processing Cooperatives
5-15 Higashi-jujyo 6-chome
Kita-ku, Tokyo

NISHIKAWA, E.N.
Executive Vice-President
Nippon Suisan Kaisha Ltd
6-2 Ohtemachi 2-chome
Chiyoda-ku, Tokyo 100

NISHIMURA, K.
President
Canners' Association of Japan
Marunouchi Building
4-1 Marunouchi 2-chome
Chiyoda-ku, Tokyo

NODA, E.
Counsellor
United Nations Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

NOGUCHI, E.
Japan Frozen Food Inspection Corporation
1-7 Yuraku-cho
Chiyoda-ku, Tokyo

NONAKA, Prof. J.
Faculty of Fisheries
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

OHBA, T.
Director
Oceanic Fishery Department
Fishery Agency
Ministry of Agriculture and Forestry
2-1 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

OKADA, M.
Head, Marine Product Utilization Division
Tokai Regional Fisheries Research
Laboratory
Fishery Agency
Ministry of Agriculture and Forestry
Kachidoki 5-chome
Chuo-ku, Tokyo 104

OKUAKI, K.
Leader, Third Research Group
National Institute of Resources
Science and Technology Agency
Tokyo

OKUSHIMA, Y.
Manager
Central Research Laboratory
Nippon Suisan Kaisha Ltd
Kitano-machi
Hachioji-shi, Tokyo

SEKI, K.
International Economy Division
Economic Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

SEO, Y.
Research Laboratory
Canners' Association of Japan
Marunouchi Building
4-1 Marunouchi 2-chome
Chiyoda-ku, Tokyo

SHIOYA, K.
President
National Federation of Kneaded Fish Products Processing Cooperatives
11-3 Tsukiji Akashi-cho
Chuo-ku, Tokyo

SHISHIDO, K.S.
Operations Manager
Management Department
Kyokuyo Co. Ltd
1539 Uchikoshi-machi
Hachioji-shi, Tokyo

SOMA, T.
Managing Director
Nippon Reizo Kabushiki Kaisha Co. Ltd
13-5 Araki-cho
Shinjuku-ku, Tokyo

SUZUKI, D.
Chief Engineer
Taiyo Research Laboratory
Taiyo Fishery Co. Ltd
2-9 Tsukishima 3-chome
Chuo-ku, Tokyo

TAGUCHI, Y.
Manager
Food Processing Department
Nippon Suisan Kaisha Ltd
1780-5 Higashi-machi
Hitotsubashi-gakuen
Kodaira-shi, Tokyo

TAKAHASHI, Dr. T.
Professor
Faculty of Fisheries
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

TANAKA, Prof. K.
Faculty of Fisheries
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

TOMIYAMA, Dr. T.
Former Rector
University of Tokyo
Yayoi-cho 1-chome
Bunkyo-ku, Tokyo

TSUMORI, S.
Deputy Head
International Economy Division
Economic Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

WATANABE, Y.
Head
International Economy Division
Economic Bureau
Ministry of Foreign Affairs
2-1 Kasumigaseki 2-chome
Chiyoda-ku, Tokyo

YAMADA, A.
General Manager
Food Technology and Engineering Department
Nichiro Gyogyo Kaisha Ltd
1-11 Yuraku-cho
Chiyoda-ku, Tokyo

YAMAKAWA, T.
Director
Freshwater Fisheries Research Laboratory
Fishery Agency
Ministry of Agriculture and Forestry
Hinoshi, Miya 399
Tokyo

YASUFUKU, K.
Deputy Director-General
Fishery Agency
Ministry of Agriculture and Forestry
2-1 Kasumigaseki 1-chome
Chiyoda-ku, Tokyo

YOKOSEKI, M.
Head, Fish Preservation Division
Tokai Regional Fisheries Research Laboratory
Fishery Agency
Ministry of Agriculture and Forestry
Kachidoki 5-chome
Chuo-ku, Tokyo 104

YOKOYAMA, T.
General Manager
Fishing Division
Processing Department
Nichiro Gyogyo Kaisha Ltd
1-11 Yuraku-cho
Chiyoda-ku, Tokyo

YOSHIHARA, H.
Executive Director
Overseas Technical Cooperation Agency
42 Honmura-cho, Ichigaya
Shinjuku-ku, Tokyo

Korea, Republic of

CHONG HUI LEE
Director
Planning and Management
Office of Fisheries
111 Hap-Dong, Seodaimun-ku
Seoul

JIN YEUL KIM
Chief
Deep Sea Production Division
Office of Fisheries
111 Hap-Dong, Seodaimun-ku
Seoul

KIL WOO LEE
Manager
Department of General Affairs
The Central Federation of
Fisheries Cooperatives
88 Kyung Wun Dong, Chongro-ku
Seoul

OK SUNG BAE, Dr.
Chief
Utilization and Food Technology Section
Fisheries Research and Development
Agency
Namhang-Dong, Yungdo-ku
Pusan

Malawi

MATHOTHO, A.J.
Fisheries Officer and Co-Manager
Department of Fisheries
Ministry of Agriculture and Natural
Resources
P.O. Box 593
Lilongwe

Malaysia

BALASINGAM, M.
Senior Food Technologist
Fish Processing Station
Food Technology Department
Jalan Balek Bukit
Kuala Trengganu

Mexico

BRITO ZAMORA, I.
Control de Calidad
Productos Pesqueros Mexicanos,
S. de C.V.
B. California 255-D
Mexico 11, D.F.

DEL VALLE, F.R.
Director
Departamento de Ciencias Alimentarias
Instituto Tecnológico de Monterrey
Apartado Postal 484
Guaymas, Sonora

DIAZ GONZALEZ, O.
Sub-Director
Instituto Nacional de Pesca
Chiapas 121
Mexico 7, D.F.

DIAZ LOPEZ, Sra. María Luz
Jefe, Programa Procesos Industria
Instituto Nacional de Pesca
Chiapas 121
Mexico 7, D.F.

Morocco

BOUAYAD, M.
Chef du laboratoire de technologie
Institut des Pêches maritimes
B.P. 24
Casablanca

EL BACHA, M.
Inspecteur général de la production et
de la commercialisation
Office national des Pêches
13-15 rue Chevalier Bayard
Casablanca

LAYACHI, D.
Directeur général
Office national des Pêches
13-15 rue Chevalier Bayard
Casablanca

Netherlands

DOESBURG, Dr. J.J.
Director
Institute for Fishery Products
TNO
Postbus 183
IJmuiden

MEYBOOM, B.
Institute for Fishery Products
TNO
Postbus 183
IJmuiden

VAN IJSSELSTEIN, D.M.
Director, IGLO BV
c/o Unilever NV
Food and Drinks Coordination
Postbus 760
Rotterdam

New Zealand

BREBNER, R.M.
Manager
Sanford Limited
Auckland

HINDS, V.T.
Assistant Director
Fisheries Management Division
Ministry of Agriculture and
Fisheries
P.O. Box 2298
Wellington

Nicaragua

D'ESCOTO MUÑOZ, Excmo Sr. D. Miguel
Embajador
Embajada de Nicaragua
2-4 Roppongi 3-chome
Minato-ku, Tokyo, Japan

Nigeria

TALABI, O.
Head
Fishery Technology Branch
Federal Department of Fisheries
P.M.B. 12529
Victoria Island
Lagos

Norway

ALNAES, I.
Director
Herring Oil and Meal Industry Research
Institute
Tjaereviken pr.
N-5064 Straumsgrend

ANKJAER-JENSEN, K.
Director
Norwegian Herring Sales Association
P.O. Box 4042
N-5015 Bergen-Dreggen

ARNESEN, C.
Norsildmel
Postboks 1034
N-5001 Bergen

BERG, O.
Norsildmel
Postboks 1034
N-5001 Bergen

BIRKELAND, L.A.
Sales Director
Frionor Norwegian Frozen Fish Limited
Drammensveien 20
Oslo 2

BRAEKKAN, Dr. O.R.
Head of Division
Government Vitamin Laboratory
Directorate of Fisheries
P.O. Box 187
Bergen

FOSS, O.G.
Manager
Gadus A/S
Parkveien 55
Oslo 2

HEEN, Dr. E.
Director
Norwegian Fisheries Research Institute
P.O. Box 187
Bergen

HEGGELUND, P.O.
Research Assistant
University of Washington
Seattle
Washington 98195, U.S.A.

SAND, G.
Managing Director
Herring Oil and Meal Industry Research Institute
Tjaereviken pr.
N-5064 Straumsgrend

SUNDE, I.
Senior Chemical Engineer
Stord Bartz Industri A/S
P.O. Box 777
N-5001 Bergen

Panama

CONTINI, D.
Marine Fisheries Development Project
c/o PNUD
Apartado Postal 6314
Panama 5

Paraguay

ENCISO, Excmo Sr. D. Desiderio M.
Embajador Extraordinario y Plénipotenciario
Embajada de Paraguay
6-29 Hiroo 2-chome
Shibuya-ku, Tokyo, Japan

Peru

GUIZADO GAGO, L.A.
Director General de Transformación
Ministerio de Pesquería
Lord Cochrane 351
Miraflores, Lima

SANCHEZ TORRES, J.
Instituto del Mar del Perú
Apartado Postal 3734
Lima

Philippines

BALISTA, C.D.
Chief
Fisheries Utilization Division
Bureau of Fisheries
Manila

LUCERO, E.R.
Management Consultant
Office of the Secretary
Department of Agriculture and Natural Resources
Elliptical Circle
Diliman, Quezon City

Poland

KARNICKI, Z.S.
Chief, Fish Processing Technology Laboratory
Sea Fisheries Institute
Al. Zjednoczenia 1
Gdynia

Portugal

BRAGANÇA GIL, Dr. D.
Director
Instituto de Técnicas de Pesca
A/c do Instituto de Biologia Marítima
Cais do Sodré
Lisbon 2

OSORIO DE CASTRO, Dr. J.M.
Técnico
Junta Nacional de Fomento das Pescas
Praça Duque da Terceira 24 - 3ºD
Lisbon 2

Spain

ALEMANY TORRES, Dr. F.
Asesor
Agrupación Nacional de Buques Congeladores
Nuñez de Balbao 37
Madrid 1

FERNANDES TRELLES, J.
Consejero Comercial
Embajada de España
1-3 Roppongi
Minato-ku, Tokyo, Japan

Sri Lanka

DE BRUIN, Dr. G.H.P.
Assistant Director of Fisheries (Research)
Department of Fisheries
P.O. Box 531
Galle Face
Colombo 3

GOONEWARDENE, E.G.
Secretary
Ministry of Fisheries
P.O. Box 1707
Galle Face
Colombo 3

Sweden

ABERG, G.
Chairman
The Swedish Federation of Fisheries Unions
Box 4036
S-400 40 Gothenburg

CHRISTENSEN, S.
Engineer
Alfa-Laval AB
Fack
S-147 00 Tomba

CHRISTIANSEN, E.
Technical Director
AB Findus
Fack
S-267 00 Bjuv

HALLER, S.
Managing Director
Vastkustfisk SVC AB
Box 4030
S-400 40 Gothenburg

LONDAHL, G.
Laboratory Manager
Frigoscandia AB
Fack
S-251 01 Helsingborg

WINBERG, T.
Manager
Alfa-Laval AB
Fack
S-147 00 Tomba

Switzerland

PETERSEN, M.
Director
Findus Products Limited (Nestlé)
P.O. Box 66
CH-1800 Vevey

Thailand

BOONYAPAKDI, A.
Director
Cottage Industry Division
Industrial Promotion Department
Ministry of Industry
Rama VI Road
Bangkok

KASEMSARN, Miss Bung-Orn
Head
Fishery Technology Laboratory
Department of Fisheries
Ministry of Agriculture and Cooperatives
Rajadamnern Avenue
Bangkok

SURIYONG, K.
Fisheries Technical Officer
Department of Fisheries
Ministry of Agriculture and Cooperatives
Rajadamnern Avenue
Bangkok

Tunisia

BEN GHANEM, T.
Directeur général
Office national des Pêches
1 rue de la Goulette
Tunis

Uganda

BIRIBONWOHA, A.R.
Acting Chief Fisheries Officer
Fisheries Department
Ministry of Animal Industry, Game and Fisheries
P.O. Box 4
Entebbe

Union of Soviet Socialist Republics

BUTYSIN, S.V.
Chief, Department of Technology
Ministry of Fisheries
Dzerdjinskaja Street 9
Moscow W-41

BYKOV, Dr. V.P.
Vice-Director
All-Union Research Institute of Marine Fisheries and Oceanography (VNIRO)
17 V. Krasnoselskaya
Moscow B-140

REKHINA, Dr. N.I.
Chief, Laboratory of Fish Protein Concentrate and Minced Fish
All-Union Research Institute of Marine Fisheries and Oceanography (VNIRO)
17 V. Krasnoselskaya
Moscow B-140

SHENDERYUK, Dr. V.I.
Chief, Technological Laboratory
Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO)
Dm Donskoji 5
Kaliningrad

United Kingdom

ANDERSON, Dr. J.I.W.
Unilever Research
Unilever Limited
Colworth/Welwyn Laboratory
Colworth House
Sharnbrook
Bedford

BURGESS, Dr. G.H.O.
Director
Torry Research Station
Ministry of Agriculture, Fisheries and Food
P.O. Box 31
Aberdeen AB9 8DG

BURT, Dr. J.R.
Principal Scientific Officer
Torry Research Station
Ministry of Agriculture, Fisheries and Food
P.O. Box 31
Aberdeen AB9 8DG

COBURN, A.H.
Director
Findus Limited
St. George's House
Croydon, Surrey CR9 1NR

COLE, R.C.
Head, Fish and Meat Section
Tropical Products Institute
56-62 Gray's Inn Road
London WC1X 8LU

ELSTON, E.S.J.
Supplies Director
Birds Eye Foods Limited
Station Avenue
Walton-on-Thames, Surrey

FLEAR, F.A.
Assistant Managing Director
Ross Foods Limited
Ross House
Grimsby, Lincolnshire DN31 35W

HARWOOD, R.
Quality Control Manager
D.A. Macrae Limited
Watermill Road
Fraserburgh, Aberdeenshire

HJUL, P.M.
Editor
Fishing News International
Ludgate House
110 Fleet Street
London EC4A 2JL

HOPPER, A.G.
Technical Services Manager
White Fish Authority
St. Andrew's Dock
Hull, Yorkshire

JONES, Dr. N.R.
Deputy Director
Tropical Products Institute
56-62 Gray's Inn Road
London WC1X 8LU

LOVELL, P.R.
Managing Director
Brekkes Group
St. Andrew's Dock
Hull, Yorkshire

MACKIE, Dr. I.M.
Section Head
Proteins and Quality Assessment
Torry Research Station
Ministry of Agriculture, Fisheries and Food
P.O. Box 31
Aberdeen AB9 8DG

TAYLOR, D.G.P.
Divisional Group Manager
Overseas Shopkeeping and Manufacturing Division
Booker McConnell Limited
Bucklersbury House
83 Cannon Street
London EC4N 8EJ

YOUNG, Dr. R.
Manager
Fish Technology Section
Unilever Research Laboratory
Greyhope Road
Aberdeen AB9 2JA

United States of America

BILLY, T.J.
Deputy Chief
Research and Inspection Division
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20235

BOROCHOFF, E.H.
Department Head
The Gorton Corporation
327 Main Street
Gloucester, Massachusetts 01930

BOSHELL, R.M.
Technical Director
The Gorton Corporation
327 Main Street
Gloucester, Massachusetts 01930

CHICHESTER, Dr. C.O.
Professor
University of Rhode Island
Woodward Hall
Kingston, Rhode Island 02881

CONSTANTINIDES, Dr. S.M.
Associate Professor
Department of Food and Nutritional Sciences and Biochemistry
University of Rhode Island
Kingston, Rhode Island 02881

FINCH, R.
Chief, Fishery Products, Research and Inspection Division
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20235

GOMES, F.
Director
Quality Control Processing and Inspection
The Gorton Corporation
327 Main Street
Gloucester, Massachusetts 01930

HOLAS, F.W.
President/Chief Executive Officer
Division of Consolidated Foods Corporation
Booth Fisheries
2 North Riverside Plaza
Chicago, Illinois 60606

LEARSON, R.J.
Atlantic Fishery Products Technology Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Emerson Avenue
Gloucester, Massachusetts 01930

LEWIS, R.P.
Development Director
Far East Philippine Packing Co.
P.O. Box 1833
Manila, Philippines

LOVELL, Dr. R.T.
Professor
Department of Fisheries and Allied Aquacultures
Auburn University
Auburn, Alabama 36830

LUSK, G.
Laboratory Manager
The Gorton Corporation
327 Main Street
Gloucester, Massachusetts 01930

MAGNUSSON, H.W.
Fish Processing Adviser
USAID/ADFA/VIETNAM
APO San Francisco, California 96243

NAKATSU, L.M.
Regional Fisheries Attaché
U.S. Embassy
A012 Akasaka
Minato-ku, Tokyo, Japan

NASAKA, Y.
Fisheries Adviser
U.S. Embassy
A012 Akasaka
Minato-ku, Tokyo, Japan

NELSON, L.K.
Biologist
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
2725 Montlake Boulevard East
Seattle, Washington 98112

PETERSON, E.W.
Director
Research and Quality Assurance
Van Camp Sea Food Company
772 Tuna Street
Terminal Island, California 90731

PETERSON, J.G.
President
Washington Fish and Oyster Company of California
2 Rankin Street
San Francisco, California 94119

RICE, R.W.
Director
Consumer and Technical Services
The Gorton Corporation
327 Main Street
Gloucester, Massachusetts 01930

SIMPSON, Dr. K.
Professor
Department of Food and Resource Chemistry
University of Rhode Island
Kingston, Rhode Island 02881

SINESIO, H.G.
Managing Director
Del Monte Foods, Inc.
Azabu Heights 207
5-10 Roppongi 1-chome
Minato-ku, Tokyo, Japan

SLAVIN, J.W.
Associate Director for Resource Utilization
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20235

SPINELLI, J.
Research Chemist
Pacific Fishery Products Technology Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
2725 Montlake Boulevard East
Seattle, Washington 98112

STEINBERG, Dr. M.
Pacific Fishery Products Technology Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
2725 Montlake Boulevard East
Seattle, Washington 98112

THOMAS, Dr. F.B.
Extension Professor (Seafoods)
Department of Food Science
129F Schaub Hall
North Carolina State University
Raleigh, North Carolina 27607

Uruguay

MATTOS AVALLONE, S.
Jefe, Sector Alimentario
Laboratorio de Analisis y Ensayos
Ministerio de Industria y Comercio
Galicia 1133
Montevideo

Vietnam

LE MINH TRIET
Président
Compagnie Kiengiang
Saigon

TRAN VAN BAY
Président
Coopérative des Pêches Haibang
Saigon

Yemen, People's Democratic Republic of

HARIRI, K.
Director-General
Public Corporation of Fish Wealth
Steamer Point
Aden

Zambia

MUBANGA, J.B.
Deputy Director of Wildlife, Fisheries and National Parks
Department of Wildlife, Fisheries and Natural Resources
Chilanga
Lusaka

INTERNATIONAL ORGANIZATIONS

IAFMM

ARCHER, J.A.M.
Representative
International Association of Fish Meal Manufacturers
Swaprom (Pty) Limited
P.O. Box 255
Cape Town, South Africa

BARLOW, Dr. S.M.
Scientific Adviser
International Association of Fish Meal Manufacturers
70 Wigmore Street
London W1H OBD, England

BURTON, F.W.
Director-General
International Association of Fish Meal Manufacturers
70 Wigmore Street
London W1H OBD, England

DREOSTI, Dr. G.M.
Chairman
Scientific Committee of the IAFMM
63 Ocean View Drive
Green Point
Cape Town, South Africa

KIWI, E.N.
Representative
International Association of Fish Meal Manufacturers
Sea Harvest Corporation Pty Limited
P.O. Box 52
Saldanha, Cape Province, South Africa

KUSCHKE, C.
Representative
International Association of Fish Meal Manufacturers
Southern Sea Fishing Enterprises
P.O. Box 4
Saldanha, Cape Province, South Africa

PECK, B.
Representative
International Association of Fish Meal Manufacturers
Swaprom (Pty) Limited
P.O. Box 255
Cape Town, South Africa

IBRD

HUNT, R.D.
Economist
Economic Analysis and Projections Department
International Bank for Reconstruction and Development
1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

IDRC

ALLSOPP, Dr. W.H.L.
Associate Director
International Development Research Centre
Box 8500
Ottawa K1H 9G, Ontario, Canada

OECD

BUTCHER, L.G.B.
Principal Administrator
Fisheries Division
Organization for Economic Cooperation and Development
2 rue André-Pascal
75016 Paris, France

FOOD AND AGRICULTURE ORGANIZATION

Headquarters

JACKSON, Roy I.
Deputy Director-General

WATZINGER, H.
Director
Fishery Industries Division
Department of Fisheries

KREUZER, Dr. R.
Chief
Fishery Products and Marketing Branch
Fishery Industries Division
Department of Fisheries

KRONE, Dr. W.
Senior Fishery Industry Officer (Fish Utilization)
Fish Production and Marketing Service
Fishery Industries Division
Department of Fisheries

Field

ALIKUNHI, K.H.
Project Manager
Brackish Water Shrimp and Milkfish Culture Project
P.O. Box 2338
Jakarta, Indonesia

*APPLEYARD, W.P.
Chief
Fishery Industries Development Service
Fishery Industries Division
Department of Fisheries

BEUMER, H.
Associate Expert (Fish Processing)
Proyecto PNUD/FAO de Comercialización y Aprovechamiento del Pescado
Apartado Postal 97
Miraflores, Lima, Peru

*DISNEY, J.G.
Tropical Products Institute
56-62 Gray's Inn Road
London WC1X 8LU, England

---

* Present address

*HANSEN, P.
Director
Technological Laboratory
Ministry of Fisheries, Building 221
Technical University
2800 Lyngby, Denmark

HORN, H.J.
Fishery Processing and Marketing Expert
Fishery Survey and Development Project
B.P. 1490
Bujumbura, Burundi

MAGNUSSON, M.K.
Fish Marketing Expert
Fisheries Development and Training Project
P.O. Box 2338
Jakarta, Indonesia

*PEROVIC, V.
Director
Centar za ribu i privredu Mediterana
P.O. Box 110
Zadar, Yugoslavia

TAPIADOR, D.D.
Fishery Officer
FAO Regional Office for Asia and the Far East
Maliwan Mansion
Phra Atit Road
Bangkok 2, Thailand

TORREJON, E.
Fish Handling and Processing Technologist
Fishery Research and Development Project
c/o Resident Representative of the UNDP
Casilla de Correo 1207
Montevideo, Uruguay

Consultant

DAY, C.
Fishery Industries Division
Department of Fisheries

SECRETARIAT

Host Government

| | |
|---|---|
| Assistant Secretary | K. Mimura<br>Fishery Agency<br>Ministry of Agriculture and Forestry |
| Liaison Officer | K. Shima<br>Research and Development Department<br>Fishery Agency<br>Ministry of Agriculture and Forestry |
| Coordinator, Fellowships and Study Tours | T. Imai<br>Aquatic Products Section<br>Fishery Agency<br>Ministry of Agriculture and Forestry |
| Assistant to the Liaison Officer | M. Hashizume<br>Research and Development Department<br>Fishery Agency<br>Ministry of Agriculture and Forestry |
| Interpreters | Tamaki Mizutani<br>Mariko Tamiya<br>Yoshiko Yonekura |

* Present address

FAO

| | |
|---|---|
| Secretary | R. Kreuzer<br>Fishery Products and Marketing Branch<br>Fishery Industries Division<br>Department of Fisheries |
| Assistant Secretary | W. Krone<br>Fish Production and Marketing Service<br>Fishery Industries Division<br>Department of Fisheries |
| Press Officer | C. Day |
| Meetings Officer | Mary Clare de Freitas |
| Interpreters | Alma Huber (Chief)<br>Nicole-Isabelle Biros<br>Monique Ducroux<br>H. Lewis-Comas<br>B. Radoff<br>Anne Robson |

Appendix 6

LIST OF PAPERS

| Review Papers | | | Session |
|---|---|---|---|
| FII:FP/73/R 1 | Soudan, F. | Quality requirements for fishery products | IV |
| 2 | Cole, R.C. | Training for fisheries products industries in developing countries: requirements and possibilities | V |
| 3 | Soulsby, J.J. | Development of institutional catering and other outlets for fish in the United Kingdom | IV |
| 4 | Hansen, P.<br>Ruckes, E. | Establishment of a fish technology laboratory and training centre | V |
| 5 | Coburn, A.H. | Planning to expand markets in developed countries | IV |
| 6 | Peterkin, F.A. | Developing the Guyana shrimp industry | IV |
| 7 | Anderson, A.M. | Expansion of domestic markets in developing countries | IV |
| 8 | Bykov, V.P. | Opportunities for upgrading fish with lower market value | III |
| 9 | Allen, W.T. | Developing export markets for New Zealand fishery products | IV |
| 10 | Del Valle, F.R. | A quick-salting process for fish | II |
| 11 | Birkeland, L. | Expansion of export markets in developed countries | IV |
| 12 | Mendelsohn, J.M. | Rapid salting of fish | II |
| 13 | Liston, J. | Manpower requirements and training for fishery product industries | V |
| 14 | Allsopp, W.H.L. | Research and development activities of the International Development Research Centre of Canada in West Africa and the Caribbean | VI |
| 15 | Burgess, G.H.O. | The contribution of fish technology to the utilization of fish resources | I |
| 16 | Finch, R. | Some dynamics of fisheries | I |
| 17 | Lisac, H. | Upgrading and adapting fishery products of lower market value | III |

| | | | | Session |
|---|---|---|---|---|
| FII:FP/73/R | 18 | Amano, K. | Opportunities for improving fishery products | III |
| | 19 | Whitaker, R. | Analysis and characteristics of United States demand for fishery products | IV |
| | 20 | Hall, D.N.F.<br>Jones, N.R. | British assistance in the development of fish handling, processing and preservation industries | VI |
| | 21 | Day, C. | Some aspects of the role of external aid relative to development of fishery industries | VI |
| | 22 | Kreuzer, R. | Fish and its place in culture | I |
| | 23 | Meyboom, B. | Training for fishery product industries | V |
| | 24 | Krone, W.<br>Ruckes, E. | Export markets for fishery products from developing countries | IV |
| | 25 | Hamlisch, R. | The role of joint ventures in establishing fishery industries | VI |
| | 26 | da Costa, A. | The fishery products industries in the developing world | I |

Experience Papers

| | | | | |
|---|---|---|---|---|
| FII:FP/73/E | 1 | Dreosti, G.M. | The future of powdered fish products | III |
| | 2 | Oettle, K.A. | The commercial exploitation of South African hake | II |
| | 3 | Morisawa, M. | The Japanese experience in developing export markets for fishery products | IV |
| | 4 | Iredale, D.G. | Problems in the utilization of freshwater fish | II |
| | 5 | Burt, J.R. | The commercial utilization of Cape hake | II |
| | 6 | Herzberg, A. | Traditional stuffed carp ("Gefilte Fish") | II |
| | 7 | Appleyard, W.P. | The requirements for the establishment of a food fish industry | II |
| | 8 | Jaubert, P. | Marketing aspects of powdered products in the future | III |
| | 9 | Pillai, V.K. | Utilization of sardinella resources in India | II |
| | 10 | Champagne, J.R. | The manager's approach to evaluating the feasibility of food protein ventures | IV |

| | | | | Session |
|---|---|---|---|---|
| FII:FP/73/E | 11 | Disney, J.G.<br>Cole, R.C.<br>Jones, N.R. | Considerations in the use of tropical fish species | II |
| | 12 | Jangaard, P.M. | Prospects for utilizing capelin (Mallotus villosus) for human consumption | III |
| | 13 | Mackie, I.M. | Potential production of powdered and liquid fish products for human consumption and animal feed | III |
| | 14 | Takahashi, T. | Utilization of squid as food | III |
| | 15 | Windsor, M.L. | Production of liquid fish silage for animal feed | II |
| | 16 | Eddie, G.C.<br>Hopper, A.G. | Containerized stowage on fishing vessels using chilled sea-water cooling | II |
| | 17 | Hume, A.<br>Burt, J.R.<br>Wardle, C.S.<br>Bustard, C.A.<br>Watson, D.E.P. | Studies on the acceptability of farmed fish | II |
| | 18 | Aagaard, J. | Handling and processing the deep-sea shrimp, Pandalus borealis, for the freezing industry | II |
| | 19 | Gauglitz, E.J., Jr.<br>Stout, V.F.<br>Wekell, J.C. | Application of fish oils in the food industry | III |
| | 20 | Okada, M. | Trends in utilization of Alaska pollack in Japan | II |
| and Add. | 1 | Noguchi, E. | | |
| | 21 | Ackman, R.G.<br>Eaton, C.A.<br>Ke, P.J. | Utilization of barracudina as a source of wax esters and proteins | III |
| | 22 | James, D.G.<br>Olley, J. | The abalone industry in Australia | II |
| | 23 | Hansen, P.<br>Olsen, K.B.<br>Ettrup-Petersen, T. | Development in bulk preservation at sea of small whole fish | II |
| | 24 | Cann, D.C. | Bacteriological aspects of tropical shrimp | II |
| | 25 | Bligh, E.G.<br>Dyer, W.J.<br>Regier, L.W.<br>Dingle, J.R.<br>Legendre, R. | Functional and nutritive food proteins from fish | III |

| | | | Session |
|---|---|---|---|
| FII:FP/73/E 26 | Herborg, L.<br>Vilien, F.<br>Bruun, A.<br>Eggum, B. | Roller-dried fish protein | III |
| 27 | Eyssalet, R.J. | Utilizing by-catch fish from Atlantic shrimp trawlers | III |
| 28 | Spinelli, J.<br>Groninger, H.S., Jr.<br>Koury, B. | Preparation and properties of chemically and enzymically modified protein isolates for use as food ingredients | III |
| 29 | Dassow, J.A.<br>Beardsley, A.J. | The United States experience with Pacific hake (Merluccius productus) | II |
| 30 | Learson, R.J. | New methods of shellfish processing in the United States | II |
| 31 | Mjelde, A.<br>Urdahl, N. | Latest results in technology of preserving and handling small pelagic fish for food and feed | II |
| 32 | Bidenko, M.<br>Shenderyuk, V.<br>Agzhitova, L. | Technology of processing of Atlantic sardine | II |
| 33 | Billy, T.J. | Pond-grown catfish in the United States: present situation and future opportunities | III |
| 34 | Lagunov, L.L.<br>Kryuchkova, M.I.<br>Ordukhanyan, N.I.<br>Sysoeva, L.V. | Utilization of krill for human consumption | III |
| 35 | Ackman, R.G. | Marine lipids and fatty acids in human nutrition | III |
| 36 | Kreuzer, R.<br>Day, C. | The practice of product development | III |
| 37 | Lee, C.M.<br>Lee, Tung-Ching<br>Chichester, C.O. | The potential use of squid as a protein source | II |
| 38 | Pillay, T.V.R. | Aquaculture and fishery products development | III |
| 39 | Meinke, W.W. | The potential of the by-catch from shrimp trawlers | III |
| 40 | Motohiro, T. | The catches and utilization of shellfish in Japan | II |
| 41 | Seno, Y. | Processing and utilization of mackerel | II |

| | | | Session |
|---|---|---|---|
| FII:FP/73/E 42 | Ishii, S.<br>Amano, K. | Reprocessing fish into composite products | III |
| 43 | Loayza S., E. | Anchoveta utilization for human consumption in Peru | III |
| 44 | Heen, E. | The utilization of small pelagic species | II |
| 45 | Bykov, V.P. | Initial treatment of some fish species caught in the Indian Ocean | II |
| 46 | Lovell, T. | Environment-related off-flavours in intensively cultured fish | II |
| 47 | Beumer, H. | Product development experiments in Peru | III |
| 48 | Barlow, S.M.<br>Burton, F.W. | The role of fish meal in alleviation of protein shortages in human nutrition | III |
| 49 | Blackwood, C.M. | Utilization of mechanically separated fish flesh - Canadian experience | II |
| 50 | Horn, H.J. | Processing of Lake Tanganyika sardines in Burundi | II |
| 51 | Watanabe, K.<br>Mensah, E.M. | Salting, drying and smoking Tilapia galilaeus from Volta Lake | II |
| 52 | Iibuchi, S. | A new approach to technical assistance in coastal fisheries | VI |
| 53 | de Haan, D. | Alternative uses of bonito in Peru | III |
| 54 | Tapiador, D.D. | Problems in the utilization of freshwater fish in some tropical countries of Asia and the Far East | II |
| 55 | Rekhina, N.I. | The use of fish of lower market value for human consumption | III |
| 56 | Andersen, P.<br>Appleyard, W.P.<br>Hordijk, G.H.<br>Van Noort, E.C.<br>Souness, J.A. | Peruvian experience in joint ventures | VI |
| 57 | Andersen, P.<br>Appleyard, W.P.<br>Hordijk, G.H.<br>Van Noort, E.C.<br>Souness, J.A. | The development of the Peruvian merluza industry | III |
| 58 | Myklestad, O. | Fish protein processing: thermal liability and thermal economy | III |
| 59 | Ettrup-Petersen, T.<br>Holm-Christensen, B.<br>Ettrup-Petersen, E. | Utilization of fish meal protein in modern integrated system for domestic animal feeding | III |

| Technical Notes | | | Session |
|---|---|---|---|
| FII:FP/73/TN 1 | Appleyard, W.P. | Management training in fisheries | V |
| 2 | Bar-Ilan, M. | Launching the export of fishery products in Israel | IV |
| 3 | Howard, G.E.<br>Dougan, J. | Analytical indications of a more rational approach to accelerated fish sauce production | II |

General

| | |
|---|---|
| FII:FP/73/1 | Prospectus |
| 2 and Add. 1 | Information for participants |
| 3 | Programme and timetable |
| 4 | List of documents |
| 5, Rev.1 | List of participants |

Appendix 7

## STEERING COMMITTEE

| | |
|---|---|
| Matsushita, T. | Japan (Chairman) |
| Hjul, P.M. | U.K. (Rapporteur) |
| Kreuzer, R. | FAO (Secretary) |
| Krone, W. | FAO (Assistant Secretary) |
| Amano, K. | Japan |
| Blackwood, C.M. | Canada |
| Bykov, V.P. | U.S.S.R. |
| Day, C. | FAO |
| Dreosti, G.M. | IAFMM |
| Ettrup-Petersen, E. | Denmark |
| Finch, R. | U.S.A. |
| Guizado Gago, L.A. | Peru |
| Heen, E. | Norway |
| Jones, N.R. | U.K. |
| Layachi, D. | Morocco |
| Mubanga, J.B. | Zambia |
| Slavin, J.W. | U.S.A. |
| Susanto, V. | Indonesia |
| Watzinger, H. | FAO |

MR/F0316/E/7.74/1/1200